Thermo Scientific Multidrop Combi
User Manual

Rev. 1.5

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

Thermo Scientific Multidrop Combi

User Manual

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About This User Manual

Intended users

This user manual is written for the actual end user (for example, laboratory technician) and provides information on the Thermo Scientific Multidrop Combi, including the installation and operating instructions.

How to use this user manual

This user manual is designed to give you the information to:

- Review safety precautions
- Setup the Multidrop Combi
- Use the Multidrop Combi internal software
- Carry out dispensing procedures
- Perform basic cleaning and maintenance procedures
- Troubleshoot the instrument performance

This user manual also describes all the features and specifications of the Multidrop Combi instrument as well as ordering information.

Read the manual in its entirety before operating the instrument.

Keep the user manual for future reference. The user manual is an important part of the instrument and should be readily available during use of the instrument. Keep the user manual together with the instrument in case you distribute it onwards.

For more information

For the latest information on products and services, visit our websites at:

`http://www.thermo.com`
`http://www.thermo.com/multidrop`

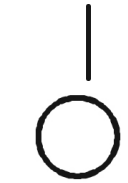
In an effort to produce useful and appropriate documentation, we appreciate your comments on this user manual to your local Thermo Fisher Scientific representative.

Safety symbols and markings

These symbols are intended to draw your attention to particularly important information and alert you to the presence of hazards as indicated.

Safety symbols and markings used on the Multidrop Combi

The following symbols and markings appear on the type label and the instrument itself.



Power ON ▲

Power OFF ▲

Serial number ▲

Catalog number ▲

Date of manufacture ▲

Consult instructions for use ▲

WEEE symbol This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. ▲

Warning and other markings used in the documentation

The following symbols and markings appear in this user manual.

Warning Risk of electric shock. ▲

Warning Biohazard risk. ▲

Warning Risk of injury to the user(s). ▲

Caution Risk of damage to the instrument, other equipment or loss of performance or function in a specific application. ▲

Note Marks a hint, important information that is useful in the optimum operation of the system, or an item of interest. ▲

Instrument safety and guidelines for use

- Always follow basic safety precautions when using the Multidrop Combi to reduce the risk of injury, biohazardous contamination, fire, or electrical shock.
- Read this user manual in its entirety prior to operating the instrument. Failure to read, understand, and follow the instructions in the manual may result in damage to the instrument, injury to laboratory and operating personnel or poor instrument performance.
- Observe all “Warning”, “Caution”, and “Note” statements as well as safety symbols and markings on the instrument and in the documentation.
- The Multidrop Combi is intended for laboratory research use only. Observe proper laboratory safety precautions, such as wearing protective clothing and following approved laboratory safety procedures.
- Use of the Multidrop Combi in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to the property. Avoid unintended use of the equipment, for example, using incompatible materials, making unauthorized modifications, using incompatible or damaged parts, using unapproved auxiliary equipment or accessories, or operating equipment in excess of maximum ratings.
- Preventative maintenance instructions should be followed closely to keep the instrument in the best condition for maximum reliability. A poorly maintained instrument will not give the best results.

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Chapter 1
Introduction to the Multidrop® Combi

The available models of the Multidrop Combi are:

- 5840300 Multidrop Combi, 100 – 240 V 50/60 Hz
- 5840310 Multidrop Combi with SMART option, 100 – 240 V 50/60 Hz

Each Multidrop Combi comes with a sample of different dispensing cassettes, including both small and standard tube cassettes. The included cassettes can cover the whole volume area, which then immediately enables full use of the instrument.

Intended use

The Multidrop Combi microplate dispenser is intended for professional research use by trained personnel. The instrument is intended for automated dispensing of up to eight different reagents simultaneously into a variety of microplates and strips in 96, 384 or 1536-well plate format. Use for self-testing is excluded.

Principle of operation

The Multidrop Combi (Figure 1–1) is an automatic, programmable, eight-channel microplate bulk reagent dispenser for microvolume dispensing. It has a peristaltic pump for rapid and continuous dispensing of liquids into various microplates. It can dispense 1 to 8 different reagents from external liquid reservoirs into different rows and can be used in several applications, for example, in drug discovery/high-throughput screening, genomic, proteomic and cell-based assays, and ELISA.

Multidrop Combi with SMART option is equipped with an inbuilt tracking system that counts the exact lifetime of the dispensing cassette.

With a volume range of 0.5 to 2500 µl for 96, 384 and 1536-well plates with plate heights from 5 to 50 mm, the Multidrop Combi offers outstanding flexibility for a wide range of applications. Also 6 – 48-well plates as well as tubes in a 96-channel rack can be used. The Multidrop Combi is lightweight, transportable and compact on a laboratory bench. It can dispense 1 µl into the entire 384-well microplate in 5 seconds or 1 µl into the entire 1536-well microplate in 14 seconds. An additional feature is that each column can be programmed to have individual volumes. Note that the whole microplate does not have to be filled. Refer to “Column selection” on page 41.

The Multidrop Combi uses detachable and autoclavable dispensing cassettes. The dispensing cassette contains eight individual tubes. Each reagent can have a separate dispensing cassette to avoid mixing of reagents. Alternatively, the same dispensing cassette can be used with several reagents if the dispensing cassette is washed in between use. Refer to “Dispensing cassettes” on page 25. All eight reagent lines can be backflushed to the reagent bottle to minimize the loss of expensive reagents.

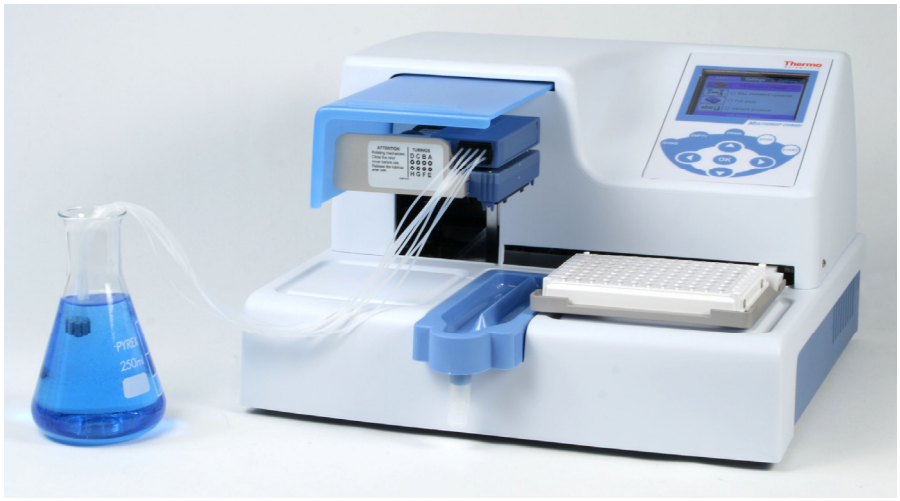


Figure 1–1. Multidrop Combi microplate dispenser

With the 96-well plate selection, the columns with 8 wells are filled starting from column 1 according to the selected columns, after which the plate carrier returns to the home position and the pump lifting mechanism to the up position. Row wise and column wise dispensing show no differences in 96-well plate dispensing.

With the 384-well plate selection, the columns with 16 wells are filled in two phases: first every other row (A, C, E, G, ... O) starting from the first column or the columns selected and then the pump carrier shifts sideways so that the remaining rows (B, D, F, H, ... P) are filled in the opposite order. If column wise dispensing is used, it shifts the pump carrier first sideways filling 16 wells and then the plate carrier moves dispensing over the next column.

With the 1536-well plate selection, the columns with 32 wells are filled in four phases: first every fourth row (A, E, I, M … AC) and then the pump carrier shifts sideways above the rows (B, F, J, N … AD), which are then filled in the opposite order. After three shifts the remaining rows (D, H, L, P … AF) are filled. Column wise dispensing shifts the pump carrier sideways three times filling 32 wells and then the plate carrier moves the dispensing head over the next column.

In 384 and 1536-well plate mode, row wise and column wise dispensing can be effectively used.

The Multidrop Combi can be used as a stand-alone instrument or controlled with a PC via an RS-232 or an USB serial port as part of a robotic system.

Advantages of using Multidrop Combi

The Multidrop Combi microplate dispenser provides several advantages relating mainly to the principle of operation in that it has:

- Flexible volume range of 0.5 – 2500 µl
- Flexible plate height of 5 – 50 mm
- Superior precision covering the whole volume range
- Easy-to-use visual user interface
- Dispensing of column-specific volumes
- Backflush feature
- High-speed dispensing of microvolumes
- Robot compatibility and versatile remote control commands
- Autoclavable and detachable dispensing cassette and priming vessel
- Cassette lifetime monitoring with Multidrop Combi SMART

Chapter 2
Functional Description

Instrument layout

This section shows the front and back views of the Multidrop Combi instrument.

Front view

The front view of the Multidrop Combi instrument is shown in Figure 2–2.

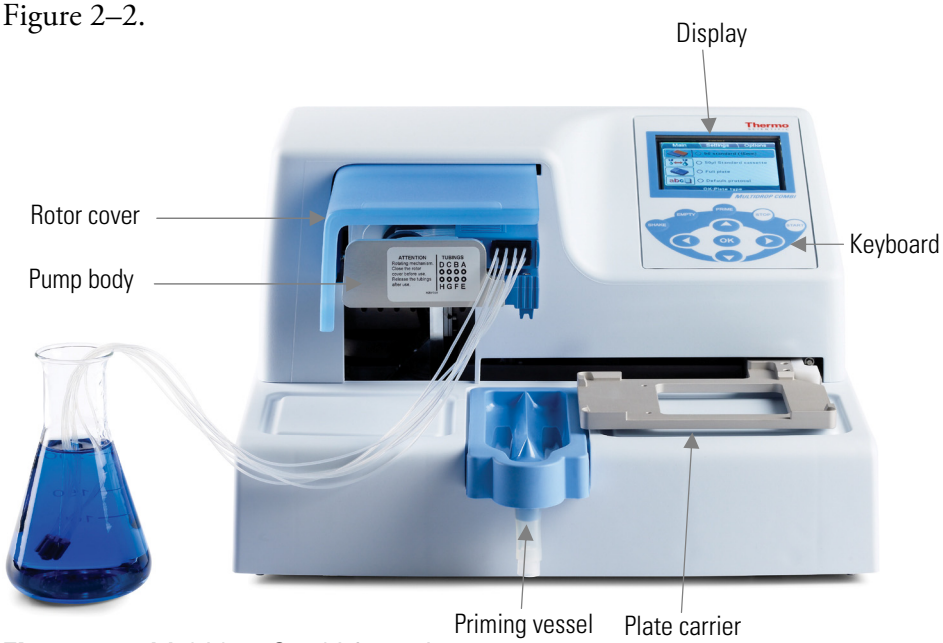


Figure 2–2. Multidrop Combi front view

The close-up of the Multidrop Combi keyboard and display is shown in Figure 2–3.

Figure 2–3. Close-up of the Multidrop Combi keyboard and display

Back view

The back view of the Multidrop Combi instrument is shown in Figure 2–4.

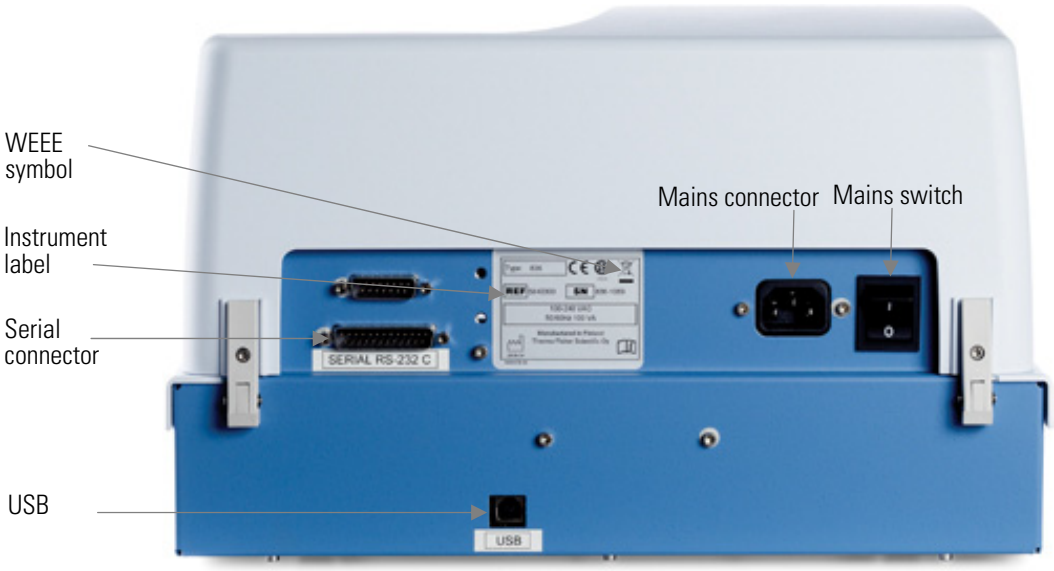


Figure 2–4. Multidrop Combi back view

Chapter 3
Installation

Delivery check

This section covers the relevant procedures to be carried out on receipt of the instrument.

Checking delivery

Check the enclosed packing list against order. In case of any deviations, contact your local Thermo Fisher Scientific representative or Thermo Fisher Scientific Oy.

Visually inspect the transport package, the instrument and the accessories for any possible transport damage.

If the carton has been damaged in transit, it is particularly important that you retain it for inspection by the carrier in case there has also been damage to the instrument.

Neither the manufacturer nor its agents can be held responsible for any damage incurred in transit, but the manufacturer will make every effort to help obtain restitution from the carrier. Upon receipt of the carrier's inspection report, arrangements will be made for repair or replacement.

If any parts are damaged, contact your local Thermo Fisher Scientific representative or Thermo Fisher Scientific Oy.

Unpacking

Move the packed instrument to its site of operation. Unpack the Multidrop Combi instrument and accessories carefully with the arrows on the transport package pointing upwards. The following notes and instructions are sent with the instrument and are immediately available when you open the package:

- Warranty Certificate card
- Packing instructions/Packing list
- *Thermo Scientific Multidrop Combi User Manual* and *Quick Reference Guide*
- Transportation discrepancy report

Retain the original packaging and packing material for future transportation. The packaging is designed to assure safe transport and minimize transit damage. Use of alternative packaging materials may invalidate the warranty. Also retain all instrument-related documentation provided by the manufacturer for future use.

Requirements

When you set up your Multidrop Combi, avoid sites of operation with excess dust, vibrations, strong magnetic fields, direct sunlight, draft, excessive moisture or large temperature fluctuations.

- Make sure the working area is flat, dry, clean and vibration-proof and leave additional room for accessories, cables, reagent bottles, and so on.
- Make sure the ambient air is clean and free of corrosive vapors, smoke and dust.
- Make sure the ambient temperature range is between +10°C (50°F) and +40°C (104°F).
- Make sure relative humidity is between 10% and 80% (non-condensing).

Leave sufficient space (at least 10 cm, 3.9 in.) on both sides and at the back of the unit to allow adequate air circulation.

The Multidrop Combi does not produce operating noise at a level that would be harmful. No sound level measurements are required after installation.

Place the instrument on a normal laboratory bench. The net weight of the entire equipment is approx. 9.1 kg (15.7 lbs.) and the dispensing cassette 128 g (0.3 lb.).

The instrument operates at voltages of 100 – 240 Vac and a frequency range of 50/60 Hz.

Precautions and limitations

- Always ensure that the local supply voltage in the laboratory conforms to that specified on the rating label on the back of the instrument (Figure 2–4).
- Do not smoke, eat or drink while using the Multidrop Combi.
- Wash your hands thoroughly after handling test fluids.
- Observe normal laboratory procedures for handling potentially dangerous samples.
- Wear proper protection clothing, such as disposable gloves, laboratory coats, and so on according to good laboratory practice.
- Ensure that the working area is well ventilated.
- Never spill fluids in or on the equipment.

Installation setups

This section describes the installation setups that you must carry out before operating or relocating the instrument.

Warning Ensure that the mains switch (Figure 2–4) at the left of the back panel is in the OFF position. Also ensure that the mains supply cable is disconnected. ▲

Releasing the transport lock

The instrument has a transport lock (Figure 3–5).

Make sure the red transport lock is released before operating the instrument.

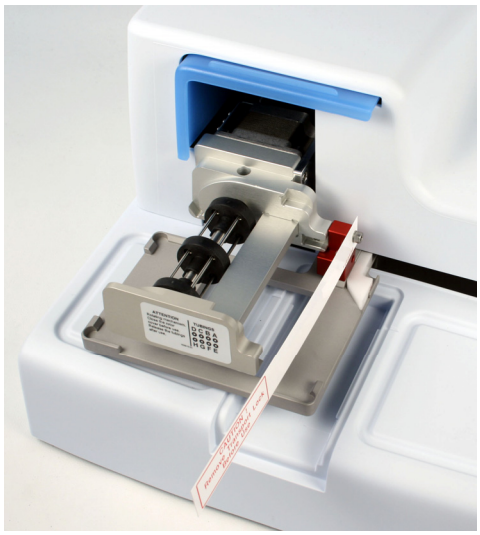


Figure 3–5. Transport lock and transport lock tag present

1. Unscrew the two screws marked 1 and 2 of the transport lock with the hexagonal screwdriver supplied (Figure 3–6) so that the track mechanism is loosened.

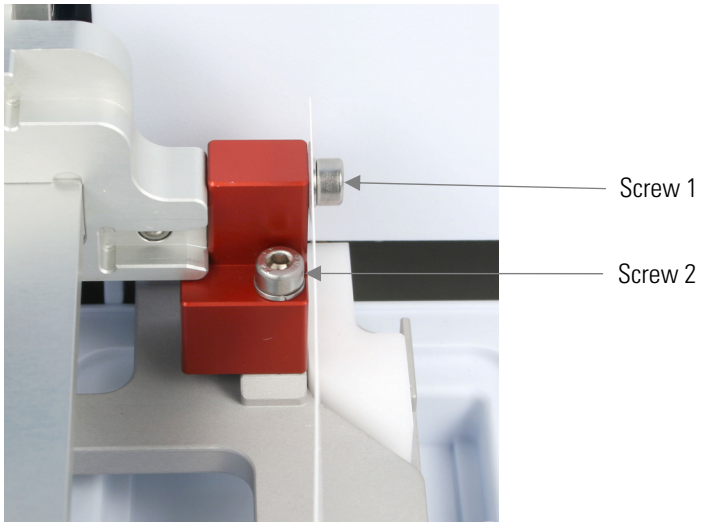


Figure 3–6. Transport lock fastened

2. Remove the screws, the transport lock piece and the transport lock tag from the screw marked 1 (Figure 3–6). Keep the tag for future relocation or transportation of the instrument. The transport lock is now released.

3. After that fasten the red transport lock piece to the back panel of the dispenser with the same screws for storage (Figure 3–7). Keep the transport lock there until needed for future relocation or transportation of the instrument.

Figure 3–7. Transport lock storage

Fastening the transport lock

1. Remove the transport lock from the back panel of the instrument (Figure 3–7).

2. First fasten the transport lock piece with screw 1 to the pump body. Then adjust the pump mechanism height and plate carrier position to fasten screw 2 (Figure 3–6).

Operational check

Complete the following procedure without the dispensing cassette to confirm the correct functioning of the dispenser prior to normal use.

1. Connect the mains supply cable and switch the instrument on using the mains switch (Figure 2–4).
   - If the instrument starts properly:
     - The display lights up.
     - The plate carrier moves to the home position and the pump lifting mechanism to the up position.

2. Install the priming vessel pressing it over a snap lock (Figure 3–8).

Figure 3–8. Inserting the priming vessel

3. Pull the rotor cover over the rotor (Figure 4–20).

4. Press **PRIME**.
   - The lifting mechanism is lowered and the pump rotates as long as you press **PRIME**.

5. Press **START**.
   - The dispensing protocol selected with the user interface is started.

If the protocol or predispense is not started, follow the instructions on the display or check Chapter 9: "*Troubleshooting Guide*".

Chapter 4
Routine Operation

Priming vessel

Ensure that the priming vessel is inserted correctly into its slot on the left of the plate carrier. You have fastened it correctly when you slide it over a snap lock. Make sure you have a tube assembly or a cap inserted into the drain of the priming vessel (Figure 4–9) or a vessel underneath the drain.

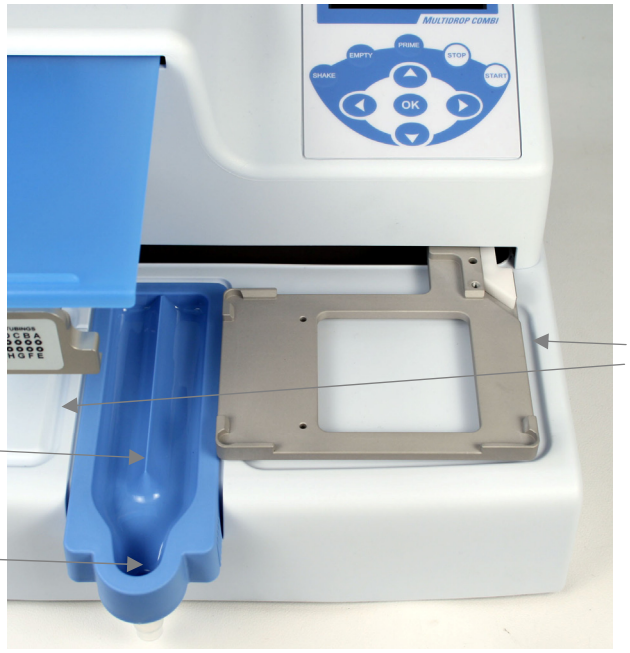

Safety grooves – designed to slope and prevent fluid from entering the instrument
Priming vessel – with a **crest** in the middle where the priming liquid is aimed at to avoid splashing and a **drain**

Figure 4–9. Priming vessel inserted into place

Dispensing cassettes

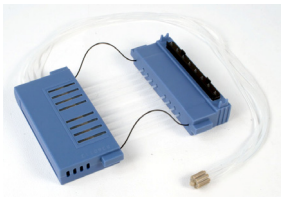
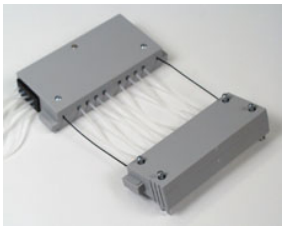
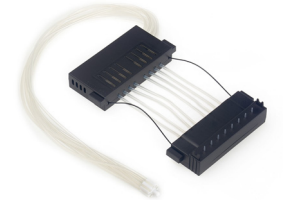
The Multidrop Combi can be used with dispensing cassettes with different tubing sizes.

The different dispensing cassettes of the Multidrop Combi are presented below. Refer to Table 4–1, Figure 4–10 and Table 10–15.

Caution With small tube cassettes, ensure that the liquid or reagent does not contain any particles > 50 µm and that the liquid container is covered. Avoid dust or any particles > 50 µm when operating with the dispensing cassette. ▲

Note Do not touch the dispensing cassette tips or the tubing inlet to ensure trouble-free dispensing. Thermo Fisher Scientific assumes no liability for the use of third-party dispensing cassettes. ▲

Table 4–1. Main types of Thermo Scientific Multidrop Combi dispensing cassettes

Picture	Code	Item	Dispensing range	Reagent pretreatment	Tubing material and ∅	Tip material and inner ∅	Autoclava-bility
	24073290* 24073292	Small tube plastic tip dispensing cassette, **blue** With SMART option	0.5-50 µl	preferably filtered, < 50 µm particles	silicone 0.4 mm	PP 0.22 mm	10 times
	24073295* 24073297	Small tube metal tip dispensing cassette, **gray** With SMART option	0.5-50 µl	preferably filtered, < 50 µm particles	silicone 0.4 mm	stainless steel, ruby 0.22 mm	10 times
	24072670* 24072675	Standard tube dispensing cassette, **black** With SMART option	5-2500 µl	–	silicone 1.3 mm	PP 0.5 mm	50 times

All the cassettes with the SMART option are labeled (see Table 10–15 for available dispensing cassettes):

* These dispensing cassettes are also available with long tube versions (see Table 10–15).

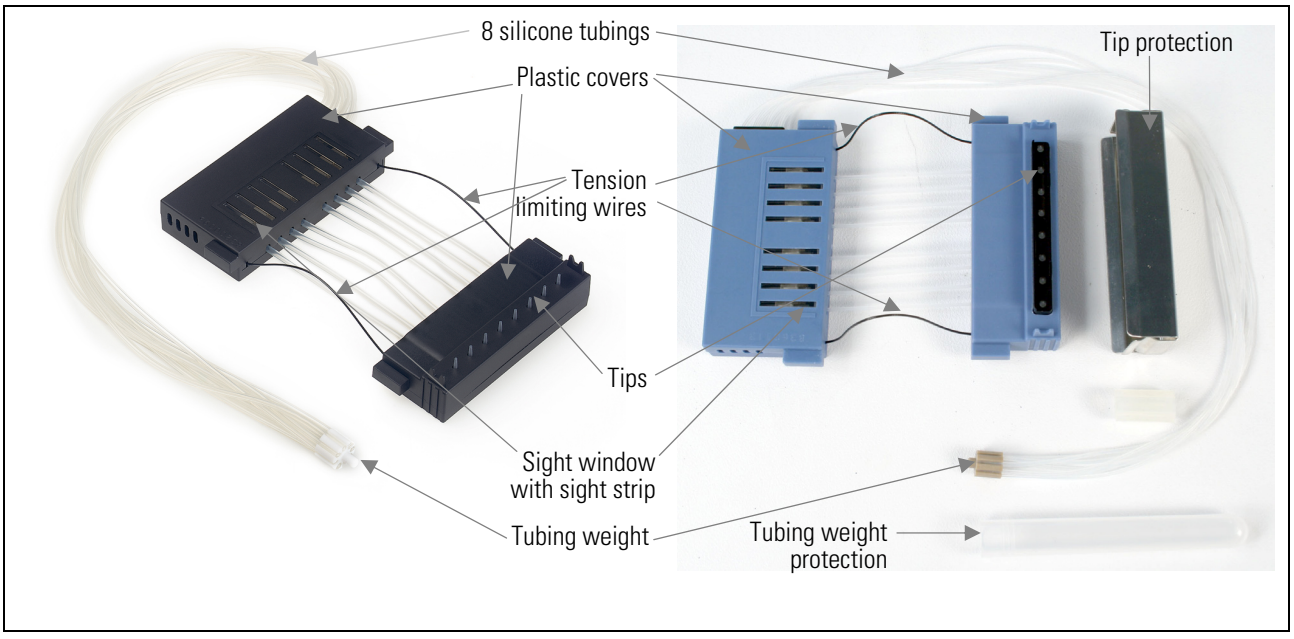


Figure 4–10. Parts of a dispensing cassette

Installing the cassette

1. Take the lower part of the cassette with the tip protection (only in small tube cassettes) into your right hand with the dispensing cassette tips pointing down and the upper part into your left hand (Figure 4–11).

Figure 4–11. Inserting the dispensing cassette

2. Carefully place the eight tubes below the pump rotor and insert the lower part of the dispensing cassette into the lower part slots of the pump body (Figure 4–12). Check that the tubes are freely placed below the pump rotor and the tension limiting wires below the rotor shaft.

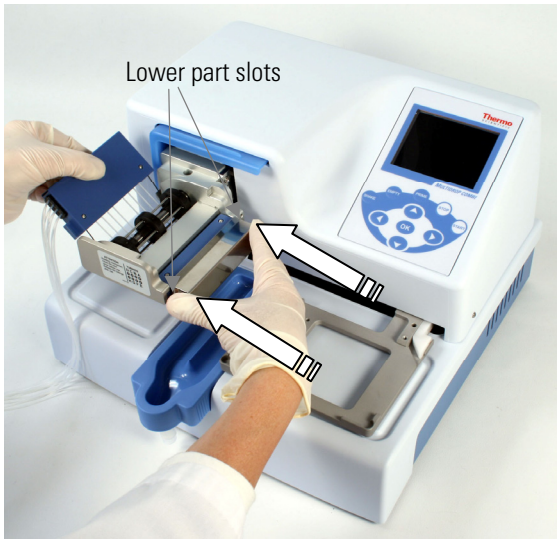


Figure 4–12. Inserting the lower part of the dispensing cassette into its slots

3. Take a firm grip on the upper part of the dispensing cassette with your right hand and carefully pull the tubes around the pump rotor until the upper part reaches and fits into the upper part slots of the pump body (Figure 4–13). Insert into the slots. Hold onto the instrument firmly with your other hand.

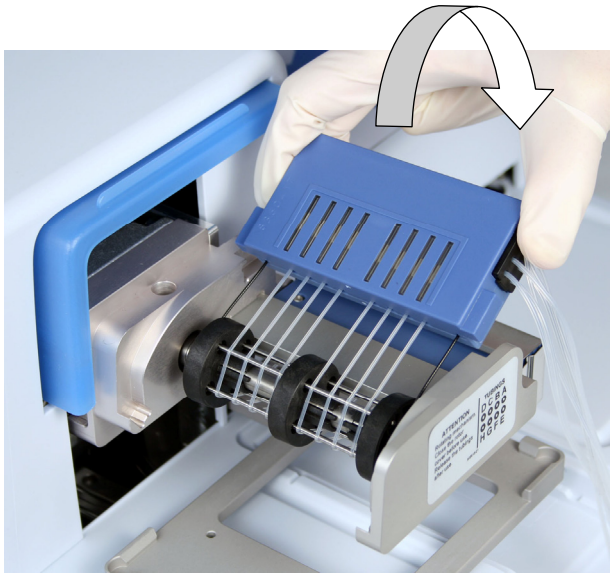


Figure 4–13. Inserting the upper part of the dispensing cassette

Note The tension limiting wires are designed to prevent the user from pulling the tubes too much as excessive tension may damage the tubes or change the calibration of the dispensing cassette. ▲

4. Double-check that both the upper and the lower parts of the dispensing cassette are properly placed into their corresponding slots (Figure 4–13 and Figure 4–14).

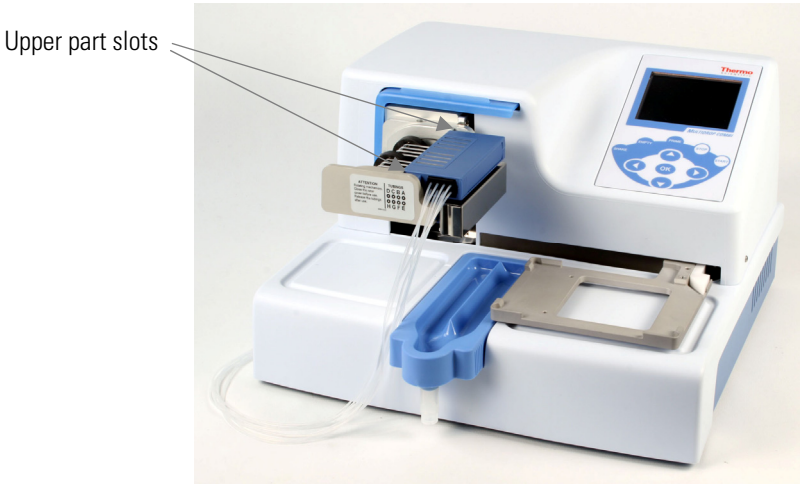


Figure 4–14. Lower and upper parts of the dispensing cassette inserted evenly into their slots

5. Ensure that all the tubes are evenly placed on the rotor needles (Figure 4–15), four tubes on each half of the pump rotor.

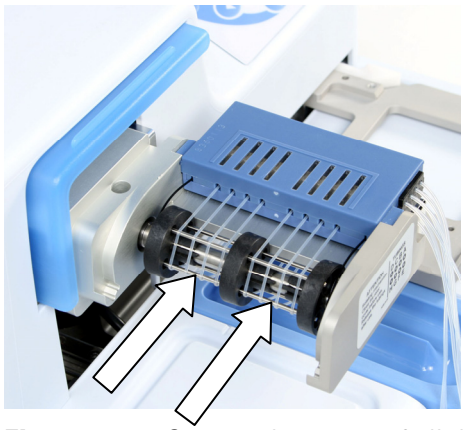


Figure 4–15. Correct placement of all the dispensing cassette tubes

6. Ensure that the tension limiting wires have a loose fit around the rotor shaft.

7. With small tube cassettes, pull the tip protection off from the dispensing cassette once the dispensing cassette has been installed (Figure 4–16).

8. Remove the tubing weight protection by removing the rubber holder and pulling the tubing weight out of the tubing protection tube (Figure 4–17 and Figure 4–18).

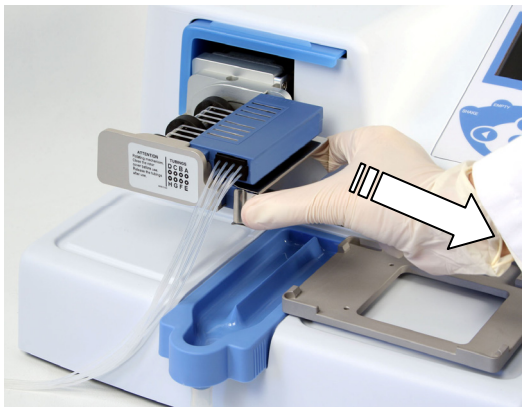


Figure 4–16. Pulling the tip protection off from the dispensing cassette

Figure 4–17. Removing the tubing weight protection and rubber holder

Figure 4–18. Cassette with the tip and tubing weight protections removed

9. Place the tubing weight into the reagent vessel, and always ensure that there is sufficient liquid present to run the protocol.

During prolonged standby, keep the cassette in its rest position (Figure 4–19).

Figure 4–19. Rest position of the dispensing cassette

10. Pull the rotor cover over the rotor (Figure 4–20). A sensor controls that the cover is properly placed over the pump rotor.

If the instrument is equipped with the SMART option and a SMART cassette is being used, the calibration data window appears and the calibration data can be viewed. The Calibration data view remains visible until you deactivate the view by pressing the **OK** or **STOP** button.

The Multidrop Combi is now ready for priming.

Figure 4–20. Pulling the rotor cover over the rotor

Control panel

This section describes the Multidrop Combi control panel and internal software.

Keyboard

The keyboard is shown in Figure 4–21.

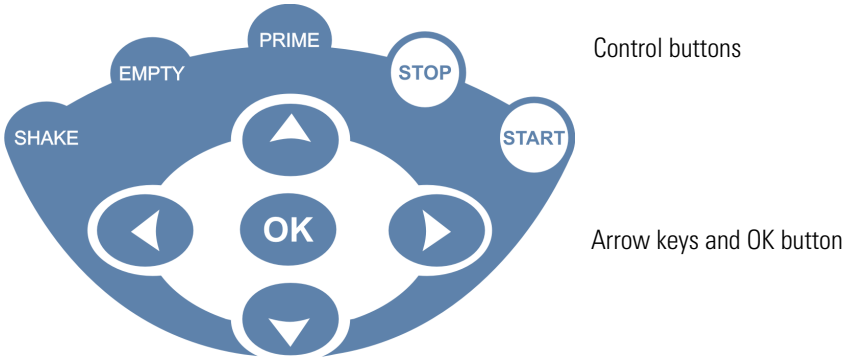


Figure 4–21. Keyboard of the Multidrop Combi

Keys

The relevant keys and control buttons are described in detail below.

The arrow keys are used to select, modify and change the parameters and to navigate in the main view.

The **OK** button is used to accept the selection.

The **START** button is used to start the dispensing protocol.

The **STOP** button is used to stop the protocol at any time. The plate and pump body are returned to the home position.
While editing values, the changes can be discarded by pressing the **STOP** button.
The **STOP** button is also used to stop the shaking action.

Note In addition, the **STOP** button is used as an “Esc” (Escape)/ “Cancel” button. ▲

The **PRIME** button is used to fill the tubings of the cassette and predispense.
Predispenses as long as you press the button.

The **EMPTY** button is used to empty the liquid from the dispensing cassette into the liquid reservoir (backflush option).
Empties as long as you press the button.

The **SHAKE** button is used to shake the plate linearly. The shaking is started by pressing the **SHAKE** button and stopped by pressing the **STOP** button.

Display

The main view in the display is shown in Figure 4–22.

Figure 4–22. Main view on the display of the Multidrop Combi

There are three *menu tabs* in the Multidrop Combi user interface: **Main**, **Settings** and **Options**. In routine use you mainly navigate in the **Main** menu. In advanced level options there are two extra levels, **Settings** and **Options**. You can navigate between these three menu levels using the **Left** and **Right** arrow keys.

The *main view row* is either colored (active) or uncolored (inactive).

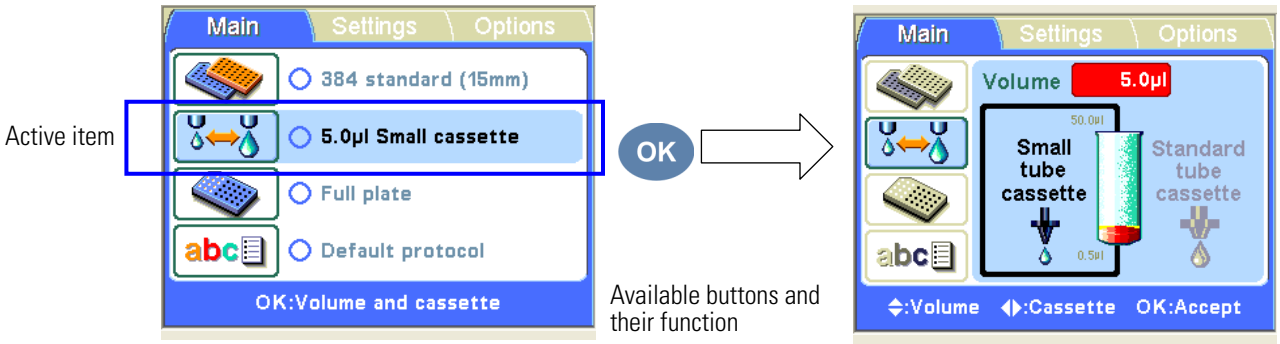
All the descriptive *icons* used in the main view are shown in Table 4–2 below.

The *info text bar* shows explanatory information on how to proceed and which keys to use.

Navigating

This section visualizes navigation in the Multidrop Combi user interface.

The main view changes according to the selections you make either with the **Up** and **Down** arrow keys or the **OK** button. The available buttons and their function are shown on the info text bar.



The color of the items, for example, the icon and main view row, in the main view changes when they are selected (active/inactive).

To move from one menu to another, make sure you are in the main view of one of the menus and use the **Left** and **Right** arrow keys.

The main views of each menu tab are shown below.

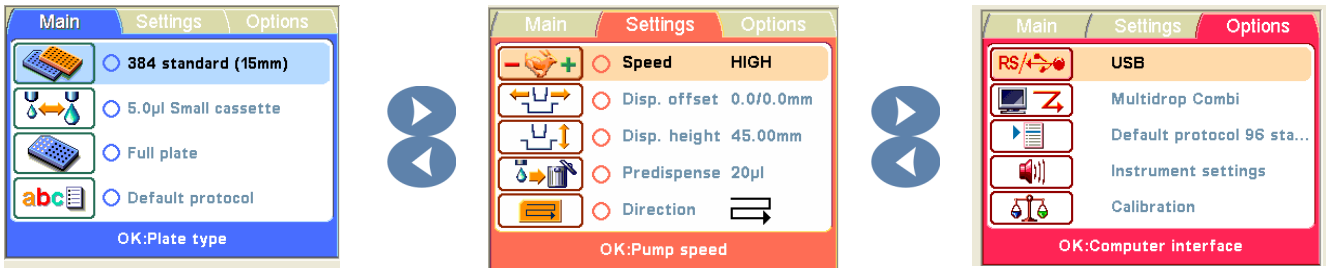
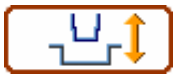


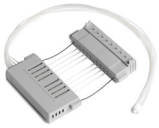
Table 4–2. Icons in the main view

Menu tab	Icon	Function
Main		"Plate type" on page 38
		"Dispensing cassette and volume" on page 40
		"Column selection" on page 41
		"Save and edit protocol" on page 51
Settings		"Dispensing speed" on page 46
		"Dispensing offset" on page 46
		"Dispensing height" on page 47
		"Predispensing volume" on page 48
		"Dispensing direction" on page 49
Options		"Computer interface" on page 56
		"Remote mode" on page 57
		"Start-up protocol" on page 58
		"Buzzer" on page 59
		"Cassette calibration" on page 60

Dispensing

You can immediately start dispensing by following the quick start guidelines below. Routine dispensing only requires to key in a few buttons.

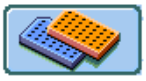
1. Power ON the instrument.

2. 

   Insert the correct dispensing cassette and the priming vessel. Close the rotor cover.

3.

   Make sure you are in the **Main** menu.

4. 

   Select the plate type and insert the plate.

5.

   First select the cassette type and then the dispensing volume.

6.

   Keep the **PRIME** button down until the tubings are completely filled.

7.

   Press the **START** button to start the protocol. The instrument dispenses the plate.

8.

   Press the **EMPTY** button to empty the dispensing tubing.

9.

   During prolonged standby, keep the cassette in its rest position.

   Remove the cassette when the maximum amount of plates are dispensed or you want to change the cassette type in use. Make sure you wash the cassette properly.

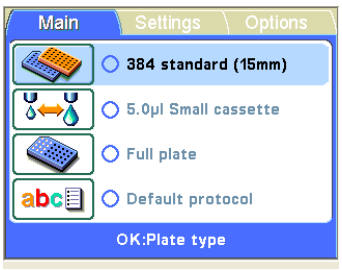
10.

    Power OFF the instrument.

Three key selections to start dispensing

After the instrument is turned on, make the following selections to start dispensing when you are in the **Main** menu: plate type, dispensing volume and cassette, and number of columns. For more information, refer to “Dispensing parameters” on page 38.

1 – **Plate type**; see Step 3 on p. 36.

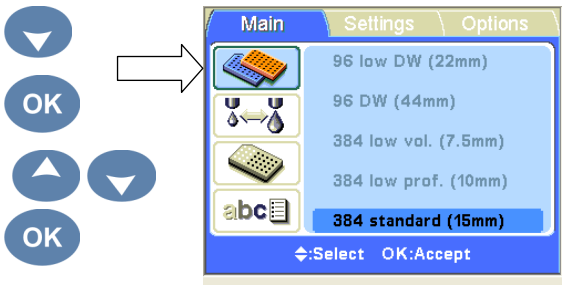


If the plate type is correct, press

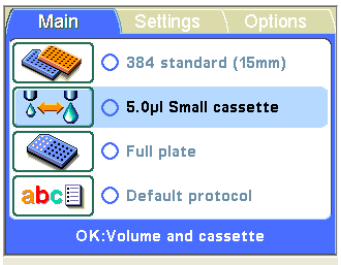
If you want to change the plate type, press

Select the plate type with

To accept, press



2 – **Volume and cassette**; see Step 4 on p. 36.



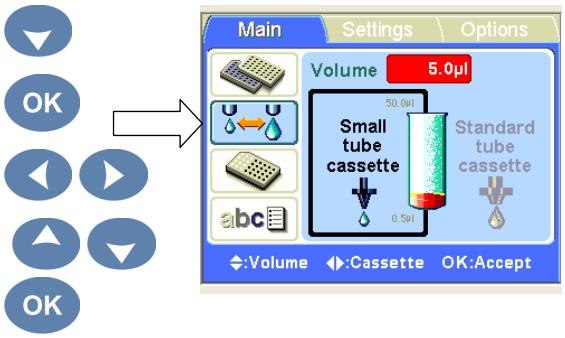
If the volume and the cassette are correct, press

If you want to change the volume, press

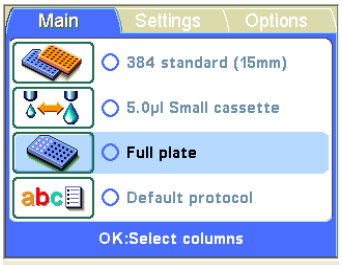
Select the appropriate cassette with

Set the needed volume with

To accept, press



3 – **Columns**; see Step 5 on p. 36.



If you intend to fill the whole plate, you can start dispensing after priming the instrument.

If you intend to fill only part of the columns, press

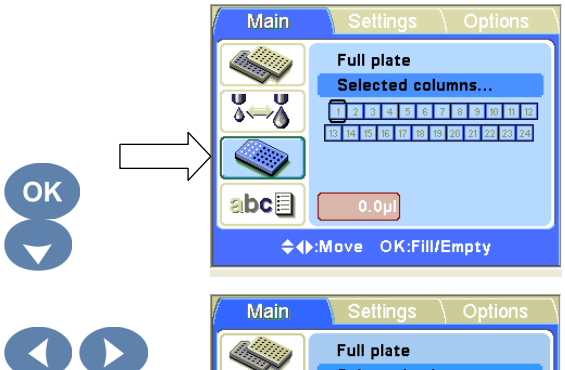
and

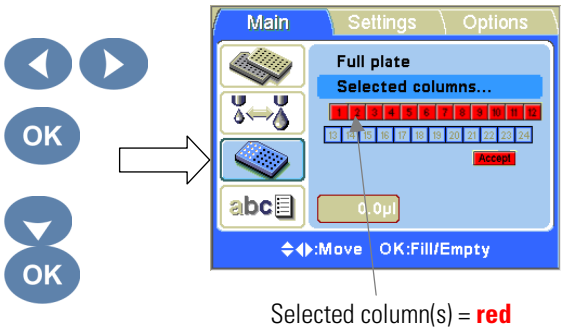
To select the columns, navigate with

and to confirm each selection, press

Last, select **Accept** with When the **Accept** box is highlighted, press

You are now ready to start after filling the tubes through predispense.





Selected column(s) = **red**

Using internal software

This section describes procedures related to the Multidrop Combi internal software.

Multidrop Combi can also be controlled with PC software, Thermo Scientific FILLit Software for Multidrop Combi (Cat. no. 5188010). For more information, refer to *Thermo Scientific FILLit Software for Multidrop Combi User Manual* (Cat. no. N07173).

Dispensing parameters

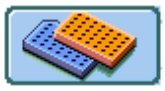
This section describes the relevant dispensing parameters required to create and edit a protocol. All these parameters are set in the **Main** menu.

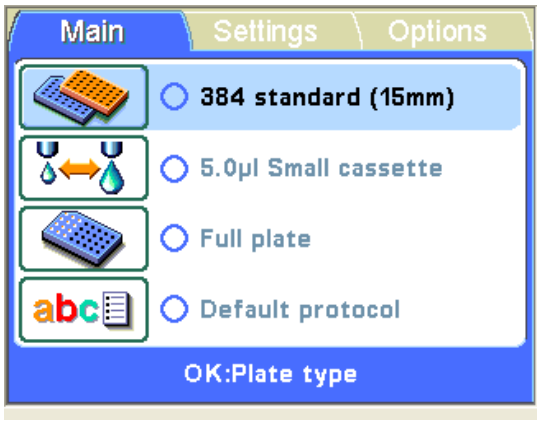
Note Make the plate type selection first because all the other parameters are dependent on the plate type. ▲

Caution Make sure the plate lid (if used) is removed before dispensing. ▲

Plate type

Go to the **Main** menu.





Press **OK**.

Select the plate type using the **Up** and **Down** arrow keys.

Press **OK** to accept the selection.

The available plate types and the default parameter values are given in Table 4–3. Each plate type has a selected default dispensing cassette type, which is automatically set by the instrument.

Table 4–3. Default parameter values for different plate types

Plate type	Cassette type	Max. dispensing volume * (µl)	Dispensing height (mm) **
96-well standard (15 mm)	Standard	500	16
96-well low DW (deep well) (22 mm)	Standard	600	23
96-well DW (44 mm)	Standard	2500	45
384-well low volume (7.5 mm)	Small	25	8.5
384-well low profile (10 mm)	Small	70	11
384-well standard (15 mm)	Small	130	16
384-well DW (22 mm)	Standard	200	23
384-well DW (44 mm)	Standard	300	45
1536-well low volume (5 mm)	Small	2	6
1536-well standard (10.5 mm)	Small	13	11.5

* You can dispense without warning to the maximum dispensing volume, but once the maximum is exceeded, a warning appears and you have to press **OK** to continue dispensing.
** The default dispensing height is 1 mm above the selected plate.

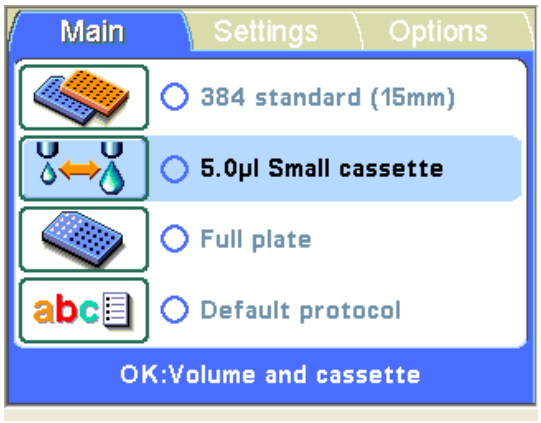
Note If the default plate values do not agree with yours, change the dispensing offset and height values under the **Settings** menu tab. You can save the plate values for future use. ▲

Note You can also get new plates for use by transferring them from FILLit Software. ▲

Dispensing cassette and volume

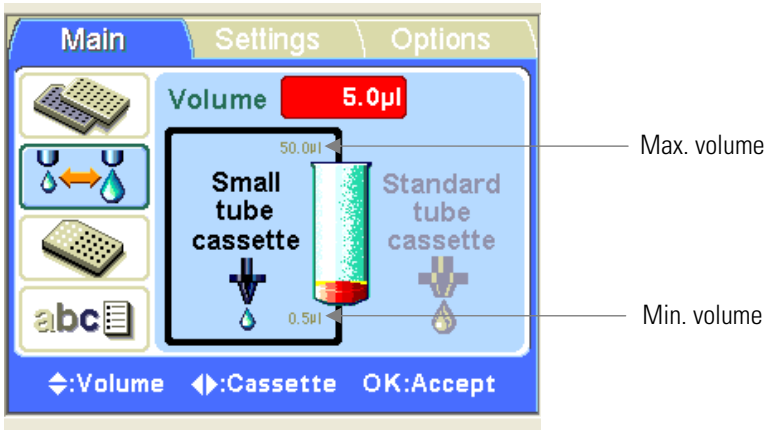
There are two types of dispensing cassettes available, *Small tube cassette* (either plastic tip or metal tip) and *Standard tube cassette*. Refer to “Dispensing cassettes” on page 25 and Table 10–15. Each dispensing cassette type covers a specific volume area.

Go to the **Main** menu. Select the **Volume and cassette** row.



OK

Press **OK**. The default cassette type and dispensing volume for the selected plate type are shown.



First select the *cassette type* using the **Left** and **Right** arrow keys.

Then select the *dispensing volume* using the **Up** and **Down** arrow keys. You can speed up the selection by holding down the arrow key continuously.

The minimum and maximum dispensing volumes are displayed in the **Volume and cassette** window. Refer to Table 4–4 below.

Table 4–4. Dispensing volumes of the cassettes

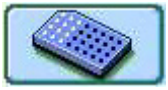
Cassette	Volume range (µl)	Increment (µl)
Small tube cassette	0.5…50	0.5
Standard tube cassette	5…2500	5

The default cassette types and dispensing volumes for different plate types are given in Table 4–3.

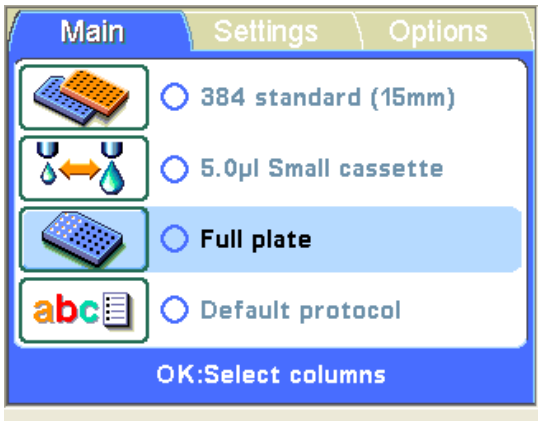
OK Accept the selections using the **OK** button.

Ensure that the cassette selection corresponds to the installed cassette.

Column selection

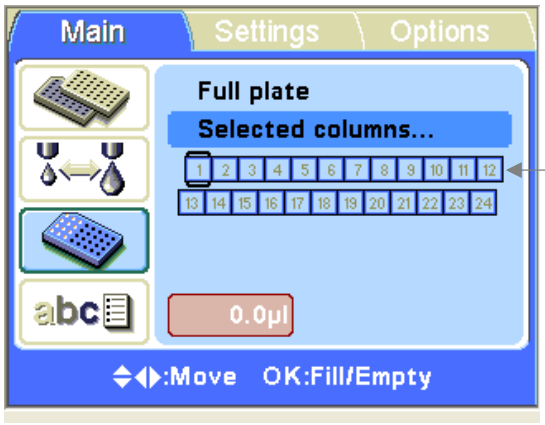


You can dispense either into the whole plate or only into certain selected columns. Go to the **Main** menu. Select the **Column selection** row.



OK Press **OK**.

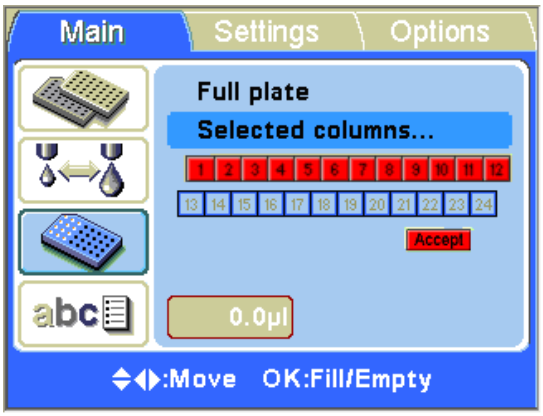
If you want to dispense into all the wells of the plate, select **Full plate** if it is not already shown on the screen. If you want to dispense only into some of the wells, select **Selected columns…** using the **Down** arrow key.



Use the arrow keys to move from one column to the next.

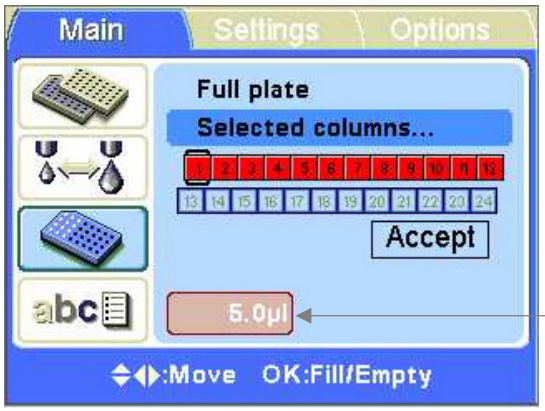
Press the **OK** button every time to select a column. The selected column becomes red. Use the **OK** button to toggle between a filled or empty column.

Use the **Down** arrow key and select **Accept** and press **OK** after selecting all the columns you wish.

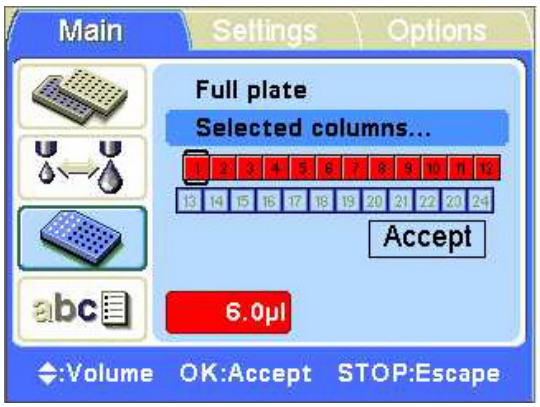


You can press the **STOP** button to exit the column selection without making any changes.

The dispensing volume selected in the **Volume and cassette** window (see “Dispensing cassette and volume” on page 40) is shown in the bottom left box. You can adjust the dispensing volume for each individual column.



Press the **OK** button for 0.5 seconds. The **Volume value** box is now activated (bright red). Adjust the dispensing volume of the column where the cursor is located using the **Up** and **Down** arrow keys.



Press **OK** after selecting the desired volume.

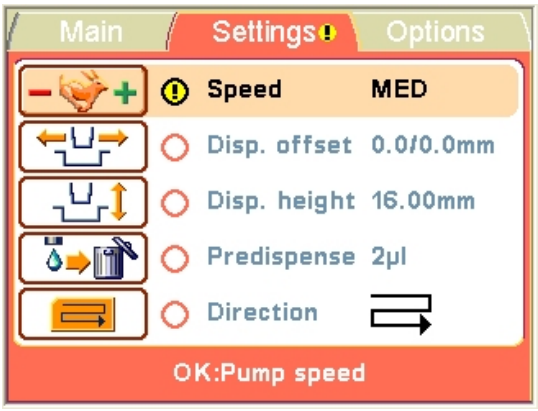
You can press the **STOP** button to exit the volume selection without making any changes.

Protocol settings

This section describes the additional parameters that supplement the plate type you have selected. These additional parameters are set in the **Settings** menu. The values shown in the **Settings** menu are those set for the plate type that is selected in the **Main** menu.

Note The protocol settings do not normally have to be changed in routine use. ▲

Note An exclamation mark will appear in the menu tab and in the circle on the main view row in question when the setting differs from the default parameter setting. ▲

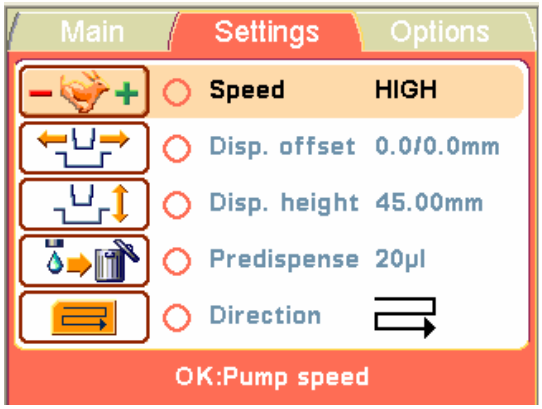


The changes made to the protocol settings only remain in the instrument memory if the protocol is saved with a name (see “Save and edit protocol” on page 51). If the protocol is not saved, the changes only remain effective until the plate type is changed or the instrument is switched off.

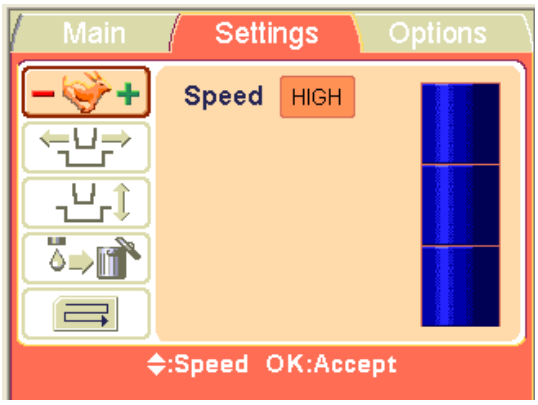
Dispensing speed

The default dispensing speed is *High*, but you can change the dispensing speed, for example, to reduce foaming. Note that the *Medium* dispensing speed gives the best dispensing results with most of the buffers.

Go to the **Settings** menu. Select the **Pump speed** row.



Press **OK**.



Use the **Up** and **Down** arrow keys to select the pump speed. The available settings are *High*, *Med* (medium) and *Low*. The default speed is *High*.

Press **OK**.

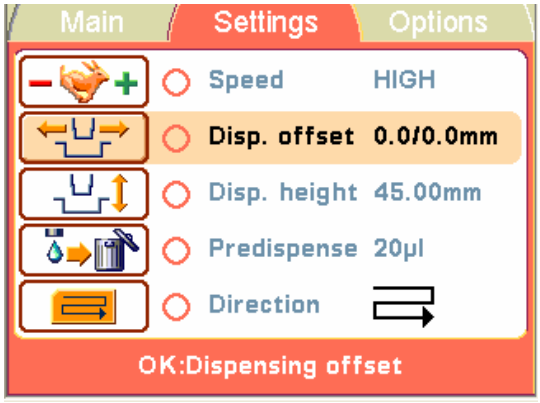
Table 4–5. Dispensing speeds

Speed	Small tube cassette (rpm)	Standard tube cassette (rpm)
HIGH	900	285
MED	733	255
LOW	567	225

Dispensing offset

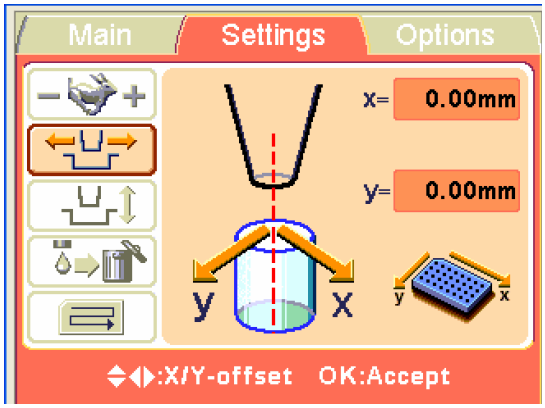
The default dispensing offset is 0.0/0.0 mm. You can change the x- and y-axis offset values if the plate used is not the standard one specified in the plate type list (see Table 4–3).

Go to the **Settings** menu. Select the **Dispensing offset** row.



Press **OK**.

The track mechanism and pump body move to the setting position.



Use the **Left** and **Right** arrow keys to set the dispensing offset in the x-axis and the **Up** and **Down** arrow keys to set it in the y-axis direction. While you change the offset values, the pump body moves * accordingly. The offset is set in 0.05 mm increments in both the + and – directions. The maximum offset value depends on the selected plate type.

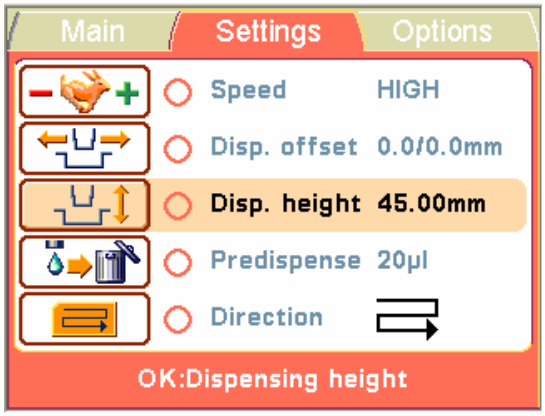
Press **OK**. If the **OK** button is not pressed within 60 seconds, the adjustments are disregarded and the main view returns to the **Settings** menu.

* y-axis = the pump body moves;
x-axis = the plate carrier moves

Dispensing height

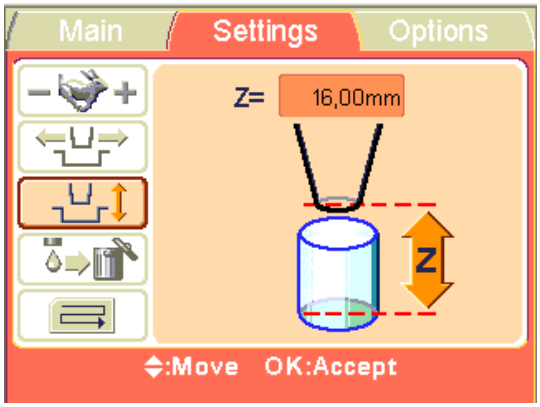
The default dispensing height depends on the plate type (see Table 4–3). You can change the dispensing height values if the plate used is not the standard one specified in the plate type list.

Go to the **Settings** menu. Select the **Dispensing height** row.



Press **OK**.

The track mechanism and pump body move to the setting position.



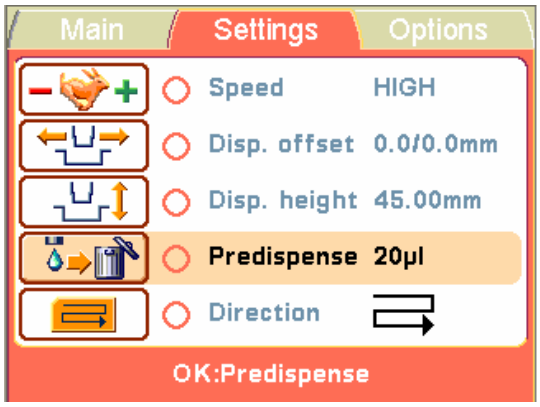
Use the **Up** and **Down** arrow keys to set the dispensing height. While you change the height, the pump body moves accordingly. The height is set in 0.05 mm increments in both the up and down directions. The minimum height value depends on the selected plate type (see Table 4–3). The default dispensing height is 1 mm above the selected plate.

Press **OK**. If the **OK** button is not pressed within 60 seconds, the adjustments are disregarded and the main view returns to the **Settings** menu.

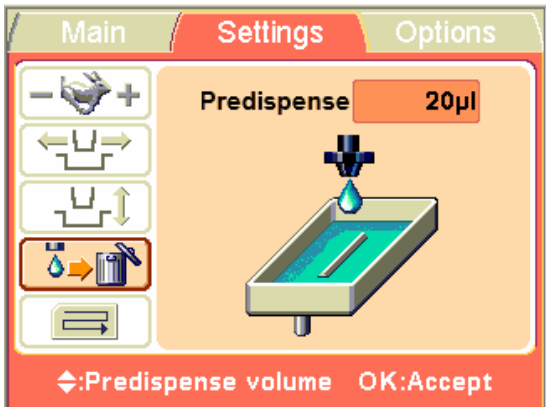
Predispensing volume

You can change the predispensing volume – the volume that is automatically dispensed before the start of plate filling, if necessary. Some more viscose solutions used may sometimes require extra predispensing.

Go to the **Settings** menu. Select the **Predispense** (**Prime**) row.



Press **OK**.



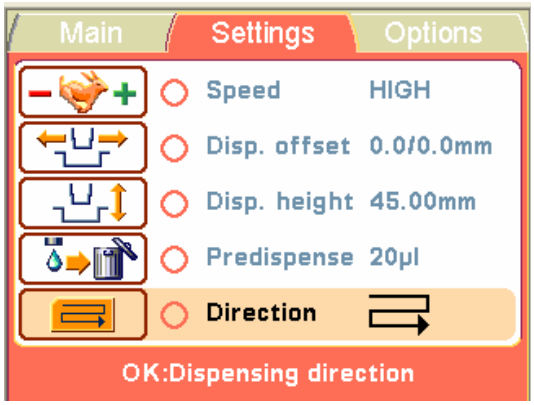
Use the **Up** and **Down** arrow keys to set the predispensing volume. The volume ranges from 2 (small tube cassettes)/10 (standard tube cassette) to 10000 µl in 1 µl increments. For default predispensing values for different plate types, refer to Table 4–3.

Press **OK**.

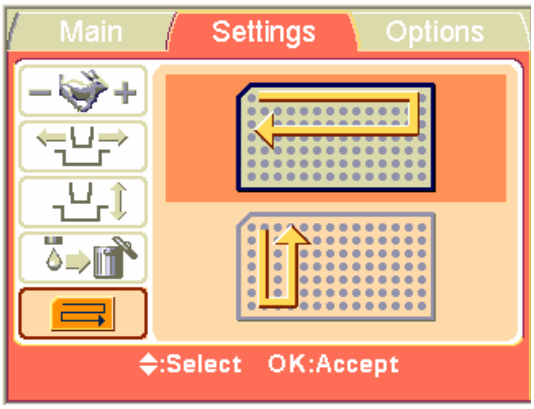
Dispensing direction

The row wise dispensing direction is default for each plate type. However, you may change the dispensing direction, if necessary.

Go to the **Settings** menu. Select the **Dispensing direction** row.



Press **OK**.



Row wise direction

Column wise direction

Use the **Up** and **Down** arrow keys to set the dispensing direction, *row wise* or *column wise*. Note that the whole action is only effective when 384 or 1536-well plate types are selected.

Press **OK**.

With the 96-well plate selection, the columns with 8 wells are filled starting from column 1 according to the selected columns, after which the plate carrier returns to the home position and the pump lifting mechanism to the up position. Row wise and column wise dispensing show no differences in 96-well plate dispensing.

With the 384-well plate selection, the columns with 16 wells are filled in two phases: first every other row (A, C, E, G, ... O) starting from the columns selected and then the pump carrier shifts sideways so that the remaining rows (B, D, F, H, ... P) are filled in the opposite order. If column wise dispensing is used, it shifts the pump carrier first sideways filling 16 wells and then the plate carrier moves dispensing over the next column.

With the 1536-well plate selection, the columns with 32 wells are filled in four phases: first every fourth row (A, E, I, M … AC) and then the pump carrier shifts sideways above the rows (B, F, J, N … AD), which are then filled in the opposite order. After three shifts the remaining rows (D, H, L, P … AF) are filled. Column wise dispensing shifts the pump carrier sideways three times filling 32 wells and then the plate carrier moves the dispensing head over the next column.

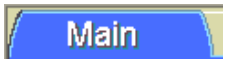
In 384 and 1536-well plate mode, row wise and column wise dispensing can be effectively used.

Running a protocol

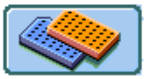
To run a dispensing protocol, follow the steps below.

Note Do not dispense extensively without any liquid.

- Check that there is always enough liquid in the reservoir and ensure that all the tube ends are below the liquid level. Use the PEEK tubing weight supplied.
- Check after each dispensing that the priming vessel is not filled up. ▲

1. 

Make sure you are in the **Main** menu.

2. 
Select the plate type. The protocols are listed according to each plate type.

3.

Select the dispensing protocol from the protocol list.

4.

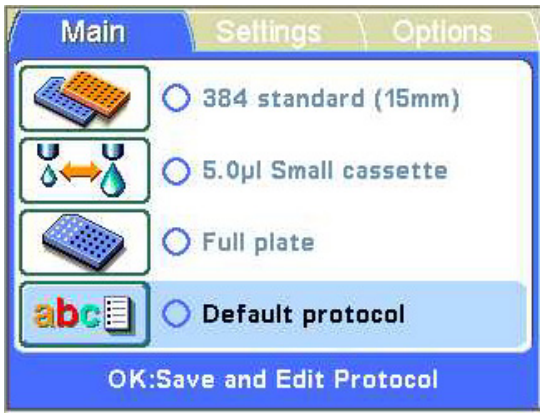
Keep the **PRIME** button down until the tubings are completely filled.

5.

Press the **START** button to start the protocol.

Save and edit protocol

Go to the **Main** menu. Select the **Save and Edit Protocol** row.



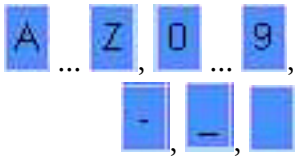
Press **OK**.

Press the **Right** arrow key to name/edit the name of your protocol.

Enter the name of your protocol.

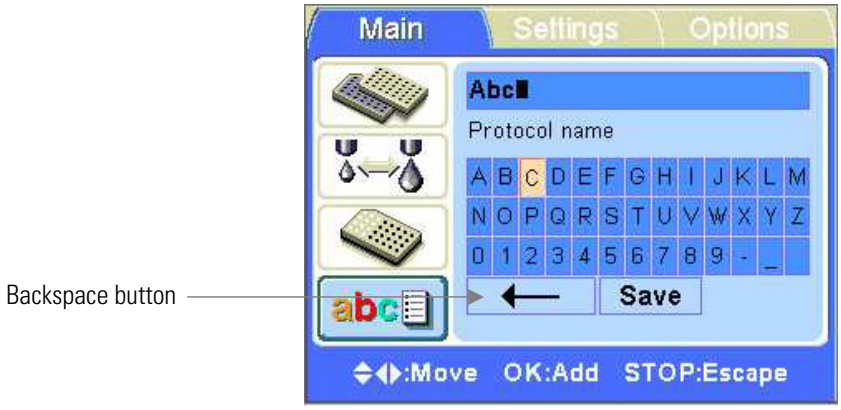
Use the arrow keys to choose the character you want.

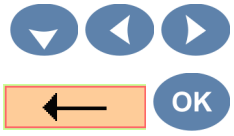
Press **OK** to enter the said character.



The available characters are: **a** to **z**, **0** to **9**, hyphen (-), underline (_), and space.

Note Use max. 20 characters, including the space character. Some of the characters are broader than the others, whereby some of the names you edit will display less than 20 characters in the protocol list, shown as three dots at the displayed name. The protocol name is automatically capitalized. ▲

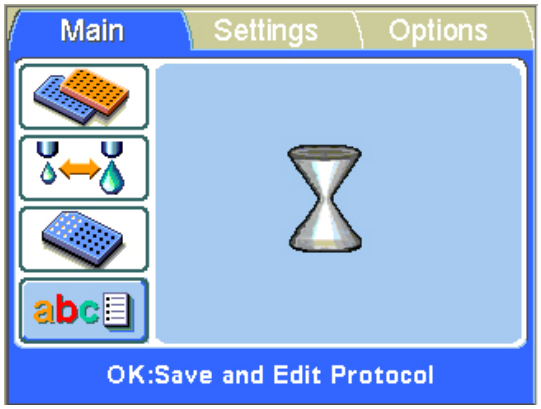

Backspace button
Main
Settings
Options
Abc
Protocol name
A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9 - _
Save
:Move OK:Add STOP:Escape



To remove characters, use the **Backspace** button. Use the **Down** arrow key (and if needed, the **Left** and **Right** arrow keys) to select the **Backspace** button and then the **OK** button to remove the character(s).

Use the **Down** arrow key to select the **Save** button and then press the **OK** button to save the edited protocol name.

The sandglass window will appear while the Save action is in progress.



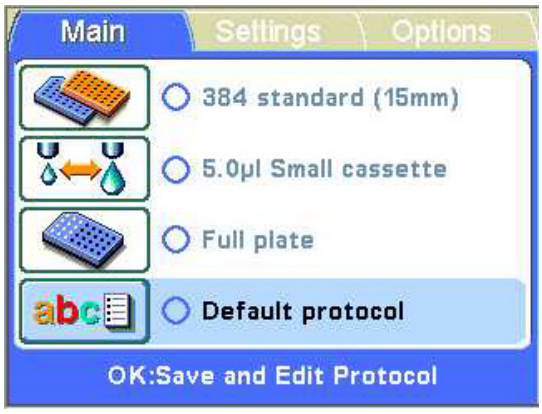
The protocol name is now shown on the **Save and Edit Protocol** row.

You can create a maximum of 100 protocols, including the factory defined protocols.

When you save the protocol, all the following parameters are saved:

Select protocol

To select an existing protocol for a particular plate type, first select the plate type (see “Plate type” on page 38) and then select the **Save and Edit Protocol** row. The protocols are listed according to each plate type.



Press **OK**.

Select the protocol using the **Up** and **Down** arrow keys.

Press **OK** to accept the selection.

The protocol is now selected.

Note In the protocol list only the protocols made for the plate type in question are shown. ▲

Delete protocol

To delete an existing protocol for a particular plate type, first select the plate type (see “Plate type” on page 38) and then select the **Save and Edit Protocol** row. The protocols are listed according to each plate type.

Press **OK**.

Select the protocol using the **Up** and **Down** arrow keys.

Press the **Right** arrow key to enter the edit mode.

Main
Settings
Options
Abc
Protocol name
A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9 - _
Save
Delete
:Move
OK:Delete Protocol

Delete button

To delete the protocol, use the **Delete** button. Use the **Down** arrow key (and if needed, the **Left** and **Right** arrow keys) to select the **Delete** button and then the **OK** button to delete the protocol. You cannot delete default protocols (the **Delete** button is not activated). Also, if you have selected a protocol to be a start-up protocol, it cannot be deleted.

The protocol is now deleted.

Instrument options

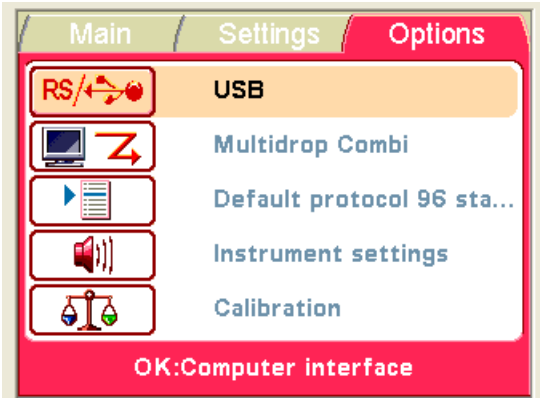
This section describes the instrument parameters. All these parameters are set in the **Options** menu. The values shown in the **Options** menu remain in the instrument memory and are instrument specific, not protocol specific.

Note You do not normally have to change the instrument options in routine use. ▲

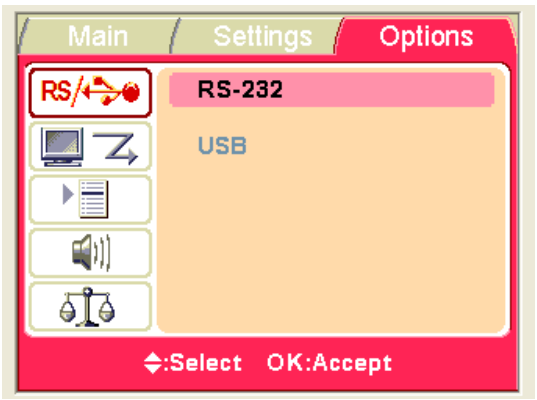
Computer interface

There are two types of computer interfaces available: RS-232 and USB.

Go to the **Options** menu. Select the **Computer interface** row.



Press **OK**.



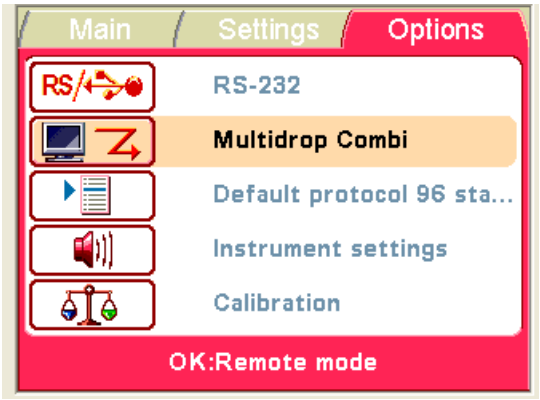
Use the **Up** and **Down** arrow keys to select the computer interface in use.

Press **OK**.

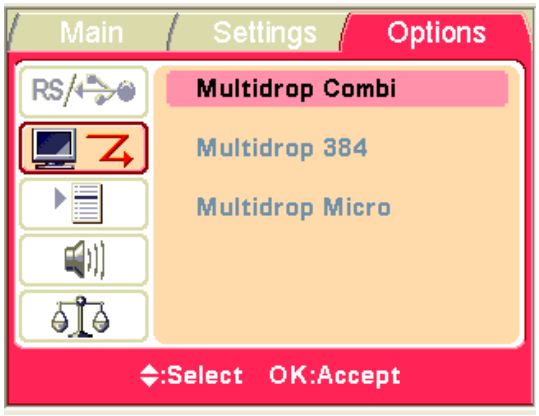
Remote mode

The Multidrop Combi can emulate the Thermo Scientific Multidrop 384 and Thermo Scientific Multidrop Micro command sets when in remote use. Thus it enables replacement of an old Multidrop unit with a Multidrop Combi. Select the dispenser in remote mode in question. Refer to “Remote control to Multidrop Combi” on page 98.

Go to the **Options** menu. Select the **Remote mode** row.



Press **OK**.



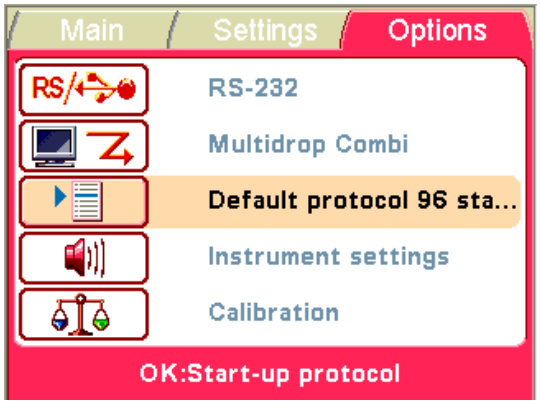
Use the **Up** and **Down** arrow keys to select the remote mode in use.

Press **OK**.

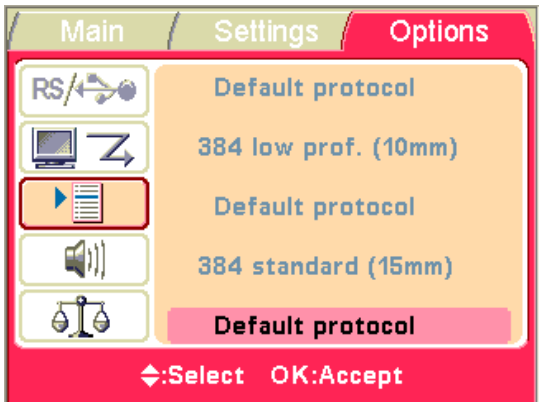
Start-up protocol

You can set which protocol is automatically selected in the **Main** menu when the Multidrop Combi is powered on.

Go to the **Options** menu. Select the **Start-up protocol** row.



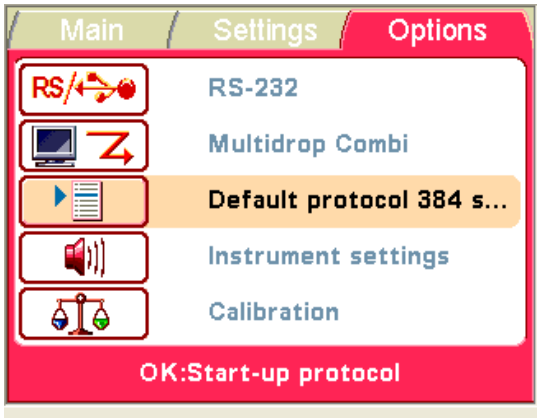
Press **OK**.



Use the **Up** and **Down** arrow keys to select the start-up protocol. The protocols are listed grouped and indented under each plate type.

Press **OK**.

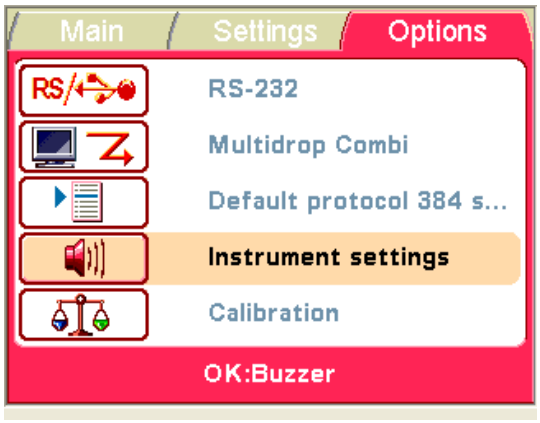
The protocol name is appended with the plate type.



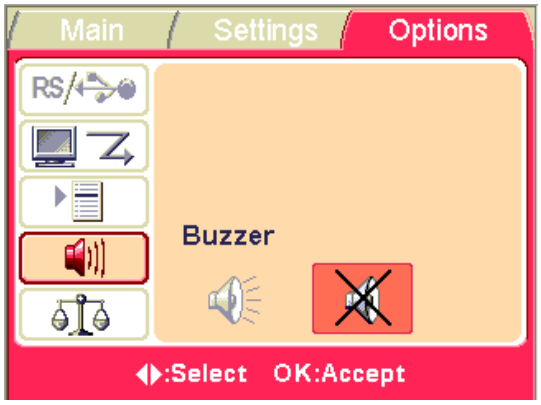
When the instrument is started up the next time, the plate type and the protocol are those just selected.

Buzzer

You can choose whether or not the instrument produces a tone for different functions. Note that all functions make a certain sound. Go to the **Options** menu. Select the **Buzzer** (**Instrument settings**) row.



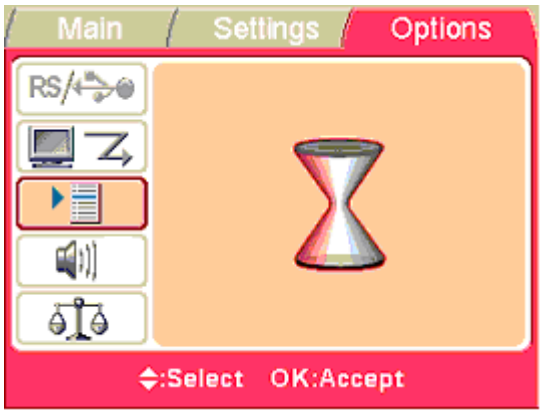
Press **OK**.



Use the **Left** and **Right** arrow keys to select whether the buzzer (audible tone) is On or Off.

Press **OK**.

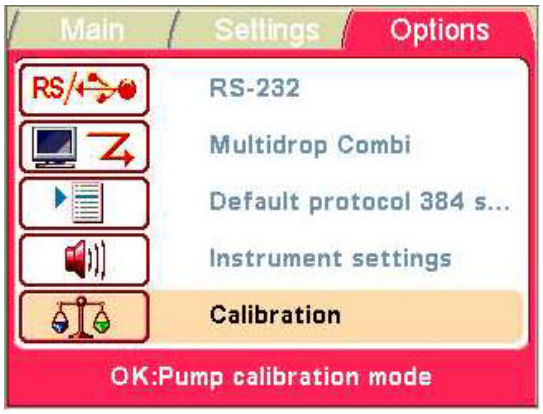
Accept/Save symbol The sandglass window will appear while the Save action is in progress.



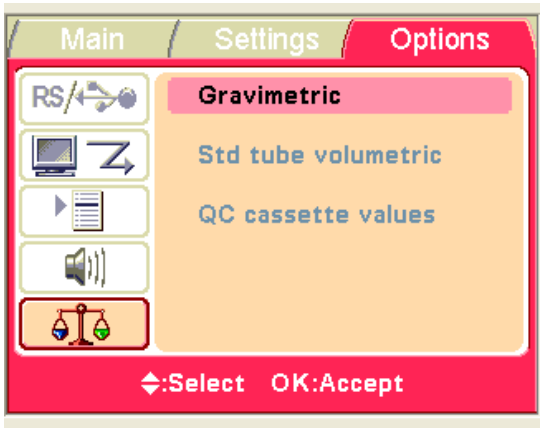
Cassette calibration

It is possible to calibrate the cassettes for different fluids. There are two different calibration modes available: *Gravimetric* and *Standard tube volumetric* (see "Verifying and recalibrating the dispensing cassette" on page 81).

Go to the **Options** menu. Select the **Calibration** row.



Press **OK**.



Use the **Up** and **Down** arrow keys to select the calibration mode. If a *SMART cassette* is used, the calibration data can be viewed.

Press **OK**.

Dispensing cassette with SMART option

The SMART dispensing cassette has an *RFID tag* incorporated that contains the information when the cassette was last calibrated, the cassette type, how much the cassette has been used for dispensing and the total usage. Refer to antenna, RFID and RFID tag in the glossary.

The Multidrop Combi equipped with SMART option calculates the usage of the cassette by incrementing rotations of the pump. The number of rotations is then compared to the specified lifetime value of each cassette.

You can check the SMART cassette calibration data either by pulling the rotor cover over the rotor or by selecting Options > QC cassette values > **OK**.

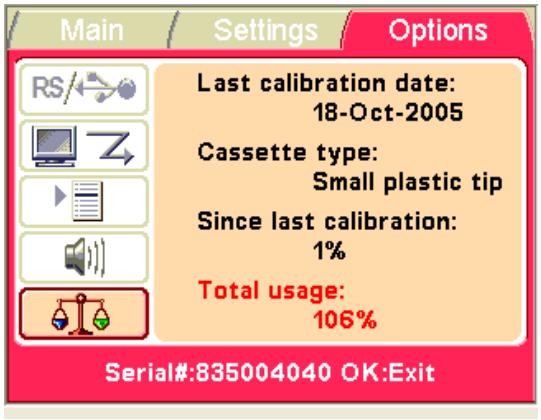
OK

For instance, the small tube cassette lifetime specification is 1000 plates of 384 wells @ 5 µl. This equals 60 000 rotations of the peristaltic pump. One 384-well plate @ 5 µl equals 60 rotations which is 0.1% of the total usage.

The **Since last calibration** percentage value will turn to zero every time the cassette is calibrated. The **Total usage** value will follow the lifetime of the cassette. Refer to the Calibration data display below.

If the total usage exceeds 100%, that is, is in the red, the cassette in question should be changed to ensure secure dispensing performance. However, the cassette can be further used, but in this case the user has to monitor the cassette tube wearing with care.

The serial number of the cassette is shown on the info text bar.



OK

Press **OK** to exit.

Table 4–6. Total usage of cassettes

Small tube cassette *	Standard tube cassette
100% usage 1000 pcs of 384-well plates @ 5 µl	100% usage 3000 pcs of 96-well plates @ 100 µl
50% usage 500 pcs of 384-well plates @ 5 µl	50% usage 1500 pcs of 96-well plates @ 100 µl
25% usage 250 pcs of 384-well plates @ 5 µl	25% usage 750 pcs of 96-well plates @ 100 µl

* If you dispense 1 µl into 1536-well plates with the small tube cassette, then the 100% usage equals approximately 1200 plates.

Screen saver

The Multidrop Combi screen saver shown below appears when the instrument has not been used for 20 minutes. You can deactivate the screen saver and return to the previous display by pressing any key.

Shutdown

To shut down the Multidrop Combi, follow these steps:

Warning Remove any microplates still on the instrument. Dispose of all microplates and strips as biohazardous waste. ▲

1. After all the plates have been dispensed, press the **EMPTY** button to return the reagent or liquid from the tubes to the reservoir.

2. If there is only a break of a few minutes in dispensing, no washing or cleaning of the tubes is necessary. However, after pressing the **EMPTY** button, release the tubing tension by pulling the upper part of the dispensing cassette from its slots and place it into its rest position slots located on the left-hand side of the rotor (Figure 4–19).

3. If there is a longer break (for example, a day), wash the dispensing cassette by priming it with deionized distilled water or with special washing detergent if necessary.

4. After washing and emptying, store the dispensing cassette in the rest position (Figure 4–19).

5. Switch the Multidrop Combi off by pressing the mains switch (Figure 2–4) at the left of the back panel of the instrument into the OFF position.

6. Wipe the instrument surfaces with a soft cloth or tissue paper moistened with deionized distilled water, a mild detergent (SDS, sodium dodecyl sulfate) or soap solution.

7. If you have spilt infectious agents on the dispenser, disinfect with 70% alcohol or some other disinfectant (see "Decontamination procedure" on page 66).

Note Keep the dispensing cassette in the rest position when the dispensing cassette is not in use (Figure 4–19). ▲

Emergency situations

In case there is any abnormal situation during operation, such as fluids spilling inside the instrument, follow these steps:

1. Switch OFF the instrument (Figure 2–4).

2. Unplug the instrument immediately from the power supply.

3. Carry out appropriate corrective measures. However, do not disassemble the instrument.

4. If the corrective measures taken do not help, contact authorized technical service or your local Thermo Fisher Scientific representative.

Chapter 5
Maintenance

A) Instrument maintenance

This section describes issues related to maintenance of the instrument.

Regular and preventive maintenance

For reliable daily operation, keep the instrument free of dust and liquid spills. To prevent unnecessary wear or hazards, follow the routine and service procedures described below at the frequency with which they should be applied.

Clean the outside of the instrument periodically with a cloth dampened with water or a mild detergent or 70% ethanol when necessary. Immediately wipe away spilt saline solutions, solvents, acids or alkaline solutions from outer surfaces to prevent damage.

Abrasive cleaning agents are not recommended, because they are likely to damage the plastic instrument cover.

Caution The surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer. Do not expose the surfaces to concentrated acids or concentrated alcohols for prolonged periods of time as damage may occur. ▲

It is recommended to service the instrument at least yearly. Refer to “Service contracts” on page 68.

If you believe that liquid has entered the Multidrop Combi, first switch the instrument off (Figure 2–4) and unplug the instrument. Carry out corrective measures. Refer to “Emergency situations” on page 63 and “Decontamination procedure” on page 66 for aid. If necessary, contact your local Thermo Fisher Scientific representative or the Thermo Fisher Scientific technical service department. Refer to “Packing for service” on page 68 and “Service request protocol” on page 106.

Warning If any surfaces are contaminated with biohazardous material, a mild sterilizing solution should be used. ▲

Caution Do not autoclave any part of this instrument except the priming vessel and the dispensing cassettes. ▲

Disposal of materials

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal. Refer to local regulations for the disposal of infectious material.

Warning The samples can be potentially infectious. Dispose of all used dispensing cassettes, plates, strips, priming vessels, disposable gloves, syringes, disposable tips, and so on as biohazardous waste. ▲

Decontamination procedure

Decontamination should be performed in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

A decontamination procedure is only recommendable when infectious substances have been in direct contact with any part(s) of the instrument.

If there is a risk of contamination with biohazardous material, the procedure recommended below or some other corresponding decontamination procedure must be performed.

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another.

Decontamination is not required for the proper functioning of the instrument.

Example of decontaminants:

- Ethanol 70%
- Virkon solution 1 – 3%
- Glutaraldehyde solution 4%
- Chloramine T
- Microcide SQ 1:64

Caution If local or laboratory regulations prescribe regular decontamination, it is not advisable to use formaldehyde, since even small traces of formaldehyde negatively affect the enzyme being used in EIA tests resulting in bad test results. ▲

Warning The decontamination procedure should be performed by authorized trained personnel in a well-ventilated room wearing disposable gloves, protective glasses and clothing. ▲

1. Prepare the decontaminant: for example, 1 – 3% Virkon solution, or 200 ml 4% glutaraldehyde solution (or another agent recommended by your safety officer).

2. Empty the reagent container. Ensure that you are wearing disposable gloves.

3. Switch OFF the power (Figure 2–4) and disconnect the mains supply cable.

4. Disinfect the outside of the instrument using a cloth dampened with 70% ethanol.

5. Place the dispensing cassette, for example, in 1 – 3% Virkon solution or 4% glutaraldehyde solution for 10 minutes and rinse it with deionized distilled water. The dispensing cassette can alternatively be autoclaved.

6. Place the instrument in a large plastic bag.

7. Place a cloth soaked in the prepared solution into the bag. Ensure that the cloth does not come into contact with the instrument.

8. Close the bag firmly and leave the instrument in the bag for at least 24 hours.

9. Remove the instrument from the bag.

10. Clean the instrument using a mild detergent.

11. Remove any stains using 70% ethanol.

12. Flush the fluid path of the instrument with deionized distilled water using the predispensing procedure.

13. Wash and disinfect the reagent containers.

14. After performing this decontamination procedure, enclose a signed and dated Certificate of Decontamination both inside the transport package and attached to the outside of the package (see Appendix B: "*Certificate of Decontamination*").

Packing for service

To pack for service, follow the guidelines presented below.

Caution It is important that the instrument is thoroughly decontaminated before it is removed from the laboratory or any servicing is performed on it. ▲

When you ship the instrument for service, remember to:

- Inform about the use of hazardous materials.
- Decontaminate the instrument beforehand. Empty the tubings of the dispenser and remove any loose items from the plate carrier, for example, plates and priming vessels before decontamination.
- Install the transport lock of the instrument. Refer to "Fastening the transport lock" on page 22.
- Pack the instrument according to the enclosed packing instructions.
- Use the original packaging to ensure that no damage occurs to the instrument during shipping. Any damage incurs additional labor charges.
- Enclose a dated and signed Certificate of Decontamination (see Appendix B: "*Certificate of Decontamination*") both inside and attached to the outside of the package, in which you return your instrument (or other items).
- Enclose the return authorization number (RGA) given by your local Thermo Fisher Scientific representative.
- Indicate the fault after contacting your local Thermo Fisher Scientific representative or the Thermo Fisher Scientific technical service department.

Refer to "General specifications" on page 95 for details on storage and transportation temperatures.

Service contracts

It is recommended to maintain and service the instrument regularly every 12 months on a contract basis by the manufacturer's trained service engineers. This ensures that the product is properly maintained and gives trouble-free service. Contact the Thermo Fisher Scientific technical service department for more details.

Disposal of the instrument

If the Multidrop Combi has to be disposed of, follow the guidelines below.

Warning Decontaminate the instrument before disposal. Refer to "Decontamination procedure" on page 66 and "Certificate of Decontamination" on page 107 about decontamination. ▲

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.

Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The proposals for the procedures vary by country.

Pollution degree	2 (see "Safety specifications" on page 96)
Method of disposal	Electronic waste Contaminated waste (Infectious waste)

WEEE symbol Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific's compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at **www.thermo.com/WEEERoHS**. ▲

Regarding the original packaging and packing materials, use the recycling operators known to you.

For more information, contact your local Thermo Fisher Scientific representative.

B) Dispensing cassette maintenance

This section describes issues related to maintenance of the dispensing cassettes.

Washing the dispensing cassette

To wash the dispensing cassette, follow these steps:

1. Wash the tubes by predispensing them with deionized distilled water. Make sure all the tubes are washed properly.

2. If cleaning with water is insufficient, use a mild laboratory detergent and then predispense with large amounts of deionized distilled water.

3. Empty the tubings of the dispensing cassette. The dispensing cassette can be dried at room temperature.

4. After washing, store the dispensing cassette in the rest position (Figure 4–19).

5. If the instrument is not used for a couple of hours, insert the dispensing cassette into the rest position (Figure 4–19). Refer to “Shutdown” on page 62. Handle the dispensing cassette with great care so that you do not damage the tubes and dispensing tips. These factors affect the useful life of the dispensing cassette.

Caution With small tube cassettes, ensure that the liquid or reagent does not contain any particles > 50 µm and that the liquid container is covered. Avoid dust or any particles > 50 µm when operating with the dispensing cassette. ▲

Cleaning the tips

The following instructions are valid for the *Small tube plastic tip dispensing cassette* and the *Standard tube dispensing cassette*. If the tip(s) are clogged, you can first try the following alternative procedures to remove the blockage.

1. Press the **EMPTY** button for a few seconds. Then press the **PRIME** button for a few seconds.

2. Place a liquid reservoir filled with deionized distilled water under the cassette tips so that the tips are submerged in liquid and press the **EMPTY** button.

3. Clean the tips according to the procedure described below (gray metal tip cassette only). Use the cleaning tool provided.

Note To avoid particles re-entering the reagent, place the tubing end weight into a separate vessel while you empty the tubing. ▲

Cleaning the metal tips

The following cleaning instructions are only valid for the *Small tube metal tip dispensing cassette*.

1. Unfasten the four screws of the cover.

2. Detach the tubing from the tips and remove the tip holder from the Small tube metal tip dispensing cassette (Cat. no. 24073295). Avoid touching the inlet of the tip.

3. Fill the 20 ml syringe (provided with the cassette) with deionized distilled water, ethanol or another suitable liquid.

4. Attach the syringe with a round filter unit (provided) and then attach the pink adapter with the short piece of tubing (provided) onto the filter unit.

5. Press liquid through the syringe to wash out any particles from the tubing.

6. Attach the short tubing onto the outlet of the tip and press liquid through the syringe (Figure 5–23).

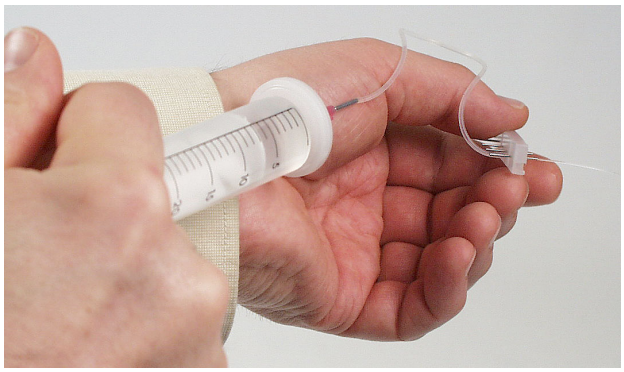


Figure 5–23. Pressing liquid through the tip

7. To verify the cleaning, remove the tubing from the tip outlet and attach it to the inlet. Press the liquid through the tip and inspect the jet coming through the tip outlet with the small orifice.

8. Insert the tubing back onto the tips and place the tip holder back into the cassette. Ensure that the tubing does not twist. Avoid touching the tip inlets.

9. Close the cover by fastening the four screws.

Autoclaving the dispensing cassette

Both small tube cassettes can be autoclaved 10 times and the standard tube cassette 50 times depending on the reagent used.

The autoclaving conditions of the dispensing cassettes are as follows: 1 bar pressure at 121°C for 20 minutes.

Warning After autoclaving, the dispensing cassette must cool down at least 2 hours to room temperature before use. ▲

Changing the tubing set

With the *Standard tube dispensing cassette* the tubing set can be changed according to the instructions below. First the tip band is changed and then the new tubing set is fitted.

Changing the tip band

1. Place the dispensing cassette onto the laboratory bench with the dispensing tips pointing down.

2. Unfasten the four cover retaining screws of the lower part of the dispensing cassette (Figure 5–24).

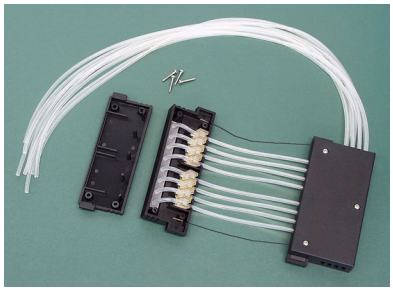


Figure 5–24. Removing the cover plate of the lower part of the dispensing cassette

3. Remove the tip manifold, the tube fasteners and the rest of the tubing from the lower part of the dispensing cassette. Then detach the tip band from the tubing by pulling the tubes away from the tip band (Figure 5–25).

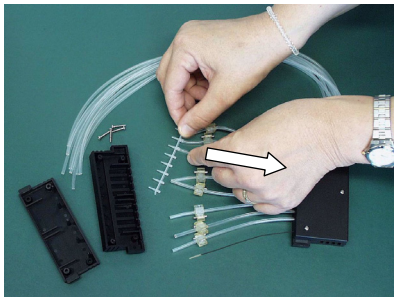


Figure 5–25. Removing the old tip band

4. Replace the tip band (Figure 5–26). The tips of the tip band must be clean to function correctly (Figure 5–27).

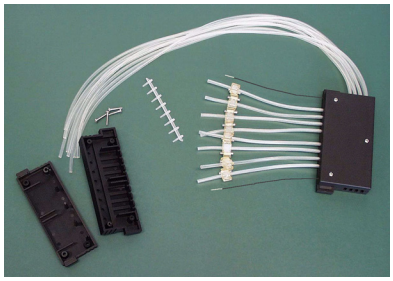


Figure 5–26. Tip band removed

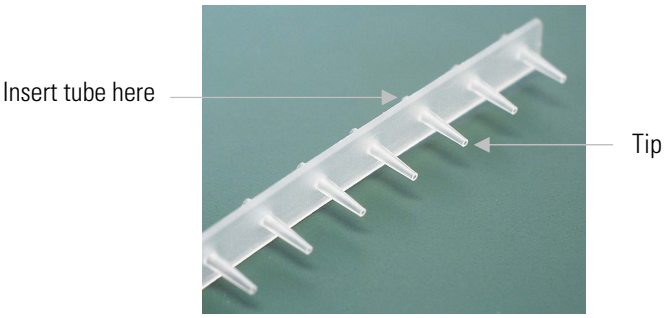


Figure 5–27. New tip band

Fitting the new tubing set step by step

1. First place the new tubing set onto the laboratory bench with the tip band attached (Figure 5–28). Ensure that you save the eight calibration screws and the PEEK tubing weight from the previous tubing set.

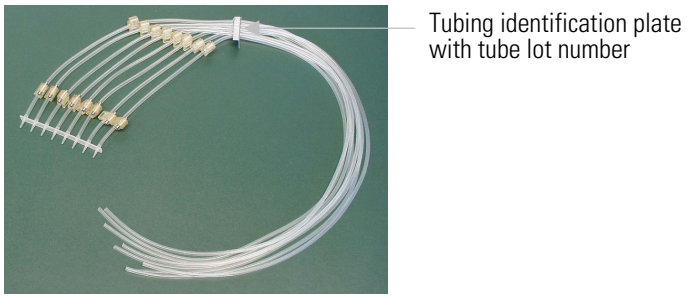


Figure 5–28. New tubing set with the tip band attached

2. Remove the four cover retaining screws on the lower part of the dispensing cassette; the tubes with the tube fasteners and the tip manifold with the tips; the three cover retaining screws on the upper part of the dispensing cassette; the two tension limiting wires; the calibration screws (Figure 5–43), and the tubes with the tube fasteners. Save the calibration screws and the PEEK tubing weight for installing the new tubing set.

3. Insert the tip manifold so that the tips go through the holes in the lower part of the dispensing cassette (Figure 5–29). Guide the tubes through the eight openings in the side wall by pressing the small cubic tube fasteners into place (Figure 5–30). Ensure that each tube is in its designated opening (Figure 5–31).

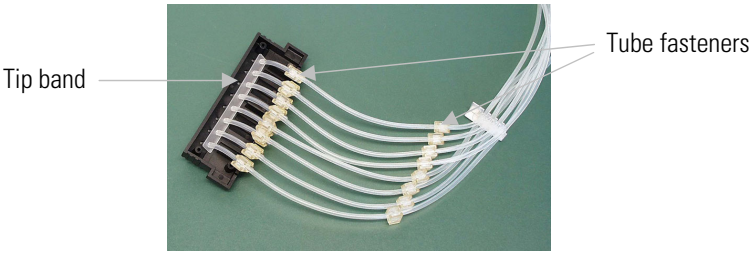


Figure 5–29. Inserting the tip manifold into the lower part of the dispensing cassette

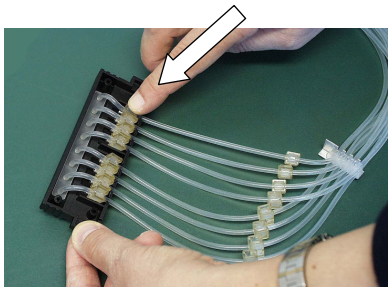


Figure 5–30. Pressing the tube fasteners into place

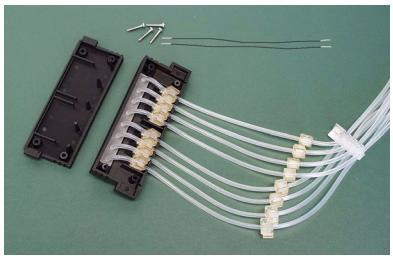


Figure 5–31. New tubing inserted into the lower part of the dispensing cassette

4. Attach the tension limiting wires into their slots (Figure 5–32).

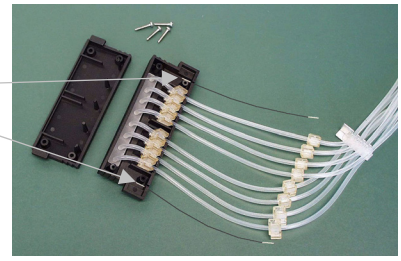


Figure 5–32. Tension limiting wires attached

5. Fasten the four cover retaining screws of the lower part of the dispensing cassette (Figure 5–33).

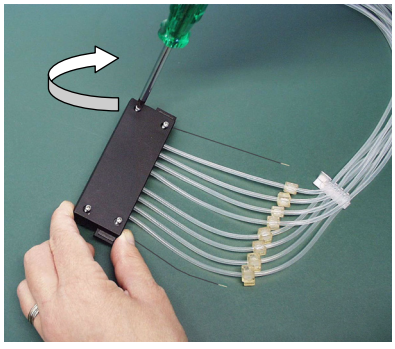


Figure 5–33. Replacing the lower part cover of the dispensing cassette

6. Once the lower part of the dispensing cassette has been fitted, place the remaining parts belonging to the upper part of the dispensing cassette onto the laboratory table (Figure 5–34).

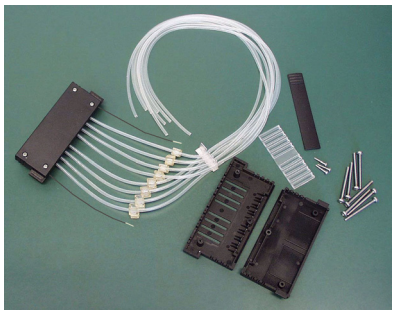


Figure 5–34. Parts belonging to the upper part of the dispensing cassette

7. Place the plastic sight window with the grooves pointing upwards onto the bottom cover of the upper part of the dispensing cassette, if it is not already there (Figure 5–35).

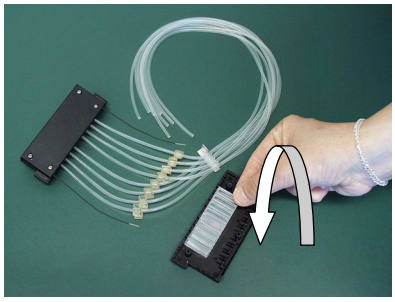


Figure 5–35. Placing the sight window

8. Press the white tubing identification plate into place on the right-hand side of the bottom cover of the upper part of the dispensing cassette (Figure 5–36).

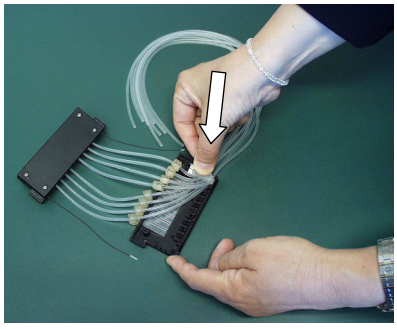


Figure 5–36. Pressing the tubing identification plate into place

9. Press each tube fastener into place in its groove on the plastic sight window (Figure 5–37).

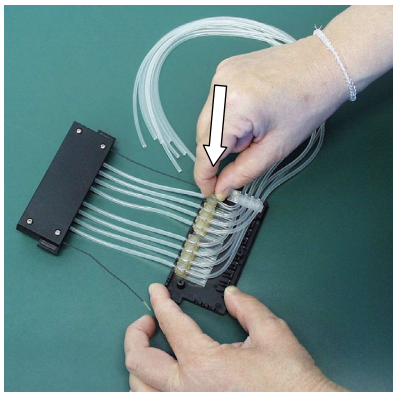


Figure 5–37. Pressing the tube fasteners into place

10. Fasten the calibration screws from the previous tubing into their places using a hexagonal screwdriver (Figure 5–38).

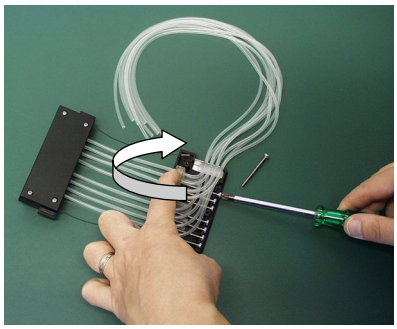


Figure 5–38. Fastening the calibration screws

11. Insert the tension limiting wires into their slots into the upper part of the dispensing cassette (Figure 5–39).

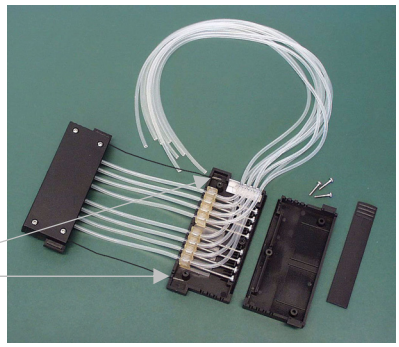


Figure 5–39. Calibration screws fastened

12. Replace the upper part cover of the dispensing cassette carefully (Figure 5–40).

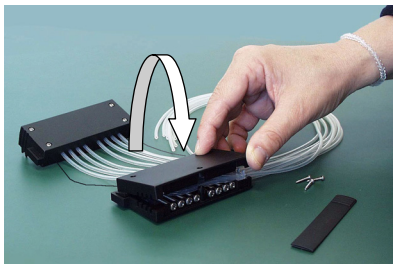


Figure 5–40. Replacing the cover of the upper part of the dispensing cassette

13. Ensure that you do not get the tubing trapped or bent between the bottom and upper cover of the upper part of the dispensing cassette (Figure 5–41).

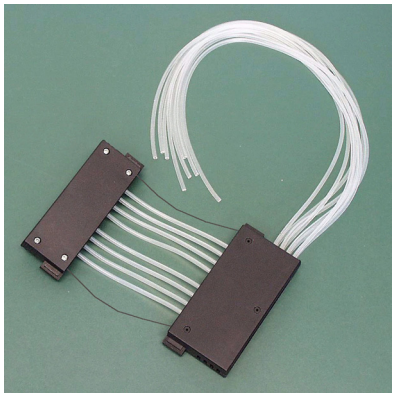


Figure 5–41. Ensuring the tubing does not get trapped

14. Fasten the three cover retaining screws of the upper part of the dispensing cassette, leaving the front screw slightly open (Figure 5–42).

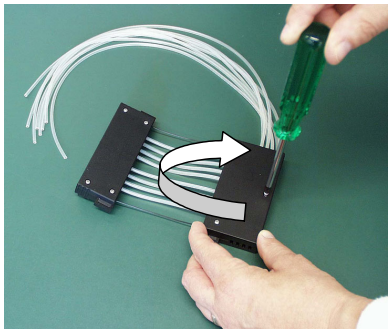


Figure 5–42. Fastening the cover retaining screws

15. Insert the calibration screw cover easier by lifting or bending the upper cover slightly (Figure 5–43).

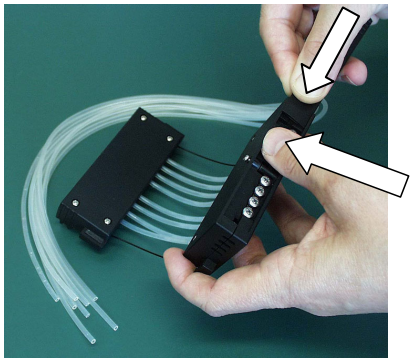


Figure 5–43. Inserting the cover on the calibration screws

16. Fasten the front cover retaining screw (Figure 5–44).

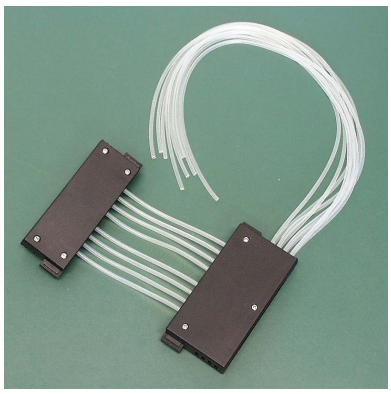


Figure 5–44. Lower and upper part of the dispensing cassette fitted

17. Turn the dispensing cassette so that the eight sight strips are visible (Figure 5–45). Look at the eight sight strips in the upper part of the dispensing cassette. You will notice that the tubes are not precalibrated. First open the calibration screw cover. For precalibration of the dispensing cassette, adjust the tube fasteners in the sight strips roughly to the middle using a hexagonal screwdriver (Figure 5–46).

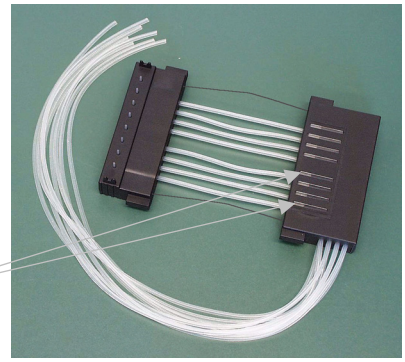


Figure 5–45. Dispensing cassette before calibration

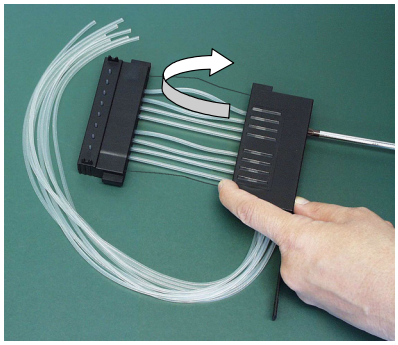


Figure 5–46. Precalibrating the dispensing cassette

18. When the tube fasteners have all been adjusted roughly to the middle of the sight strip, close the calibration screw cover (Figure 5–47).

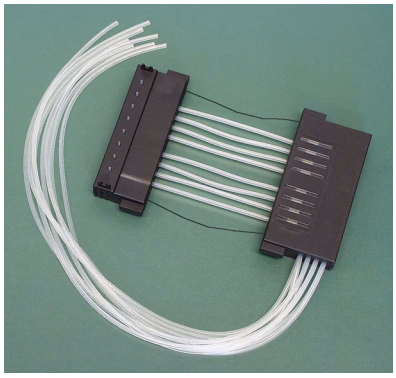


Figure 5–47. Dispensing cassette precalibrated

19. Insert the eight tubes into the PEEK tubing weight either at this stage or earlier (Figure 5–48). The new tubing set has now been successfully fitted.

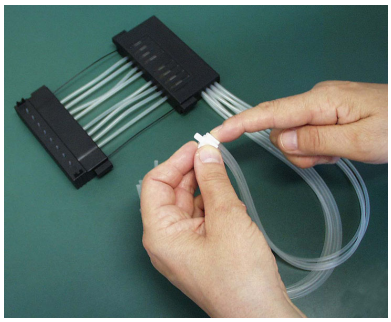


Figure 5–48. Inserting the tubes into the PEEK tubing weight

20. Calibrate the dispensing cassette according to the instructions in Chapter 6: "*Calibration of the Dispensing Cassette*".

Disposal of the dispensing cassette

Dispose of the dispensing cassette according to the legislation stipulated by the local authorities concerning take-back of the above-mentioned materials. The proposals for the procedures vary by country.

Warning The dispensing cassette may contain biohazardous materials depending on the use of the cassette. It consists of: PEEK, silicone, stainless steel, PA (polyamide), and PP (polypropylene). ▲

Chapter 6
Calibration of the Dispensing Cassette

Verifying and recalibrating the dispensing cassette

The verification and recalibration instructions cover the following three sections using the methods mentioned: accuracy verification (gravimetric); precision verification (photometric), and calibration (gravimetric).

Accuracy verification (gravimetric)

The dispensing cassette has been calibrated by the manufacturer with deionized distilled water at 22°C ± 2°C. It is recommended to recalibrate the dispensing cassettes at least monthly, depending on the frequency of use and the liquids used. It is recommended that you recalibrate the dispensing cassette if you forget the cassette in the Multidrop Combi under tension for prolonged periods, for example, a weekend or longer. You should also check the calibration when liquid types other than water are used.

For accuracy verification, use the example table (Table 6–8) as a model when you fill out the results in the enclosed empty table (Table 6–9) in the accuracy verification worksheet.

The volume conversion factor (Z) for water to change the weights into volumes at different temperatures is presented in Table 6–7.

The gravimetric method of accuracy verification requires you to weigh each individual strip that contains water to be dispensed from the Multidrop Combi. The analytical balance that you use should be well maintained, calibrated with an appropriate set of certified weights, and capable of reading with a resolution of at least 0.1 mg, preferably 0.01 mg. The gravimetric method also requires a thermometer that should be calibrated and readable to 0.5°C.

Materials and equipment needed for accuracy verification

The following materials and equipment are required for accuracy verification:

- Multidrop Combi with the dispensing cassette to be verified inserted
- Analytical balance (resolution at least 0.1 mg, preferably 0.01 mg)
- Calibrated thermometer (readable to 0.5°C)
- 96-well plate with 8 x 12 well microstrips (for example, Thermo Scientific Microtiter 1 x 12 Strip Assembled, Universal Binding Flat, Cat. no. 95029370) or another similar 8 x 12 strip plate

- Disposable gloves
- High-purity water (deionized distilled water)
- Photocopy of the accuracy verification worksheet from this manual (p. 83)

Accuracy verification procedure

1. Install the dispensing cassette (see "Installing the cassette" on page 27).

2. Pull the rotor cover over the rotor.

3. Ensure that the priming vessel is installed.

4. Set the Multidrop Combi parameters as follows (see "Dispensing parameters" on page 38):

   Plate type: 96 standard (15mm)
   Dispensing volume and cassette:
   10 µl (small tube cassette)/100 µl (standard tube cassette)
   Selected columns: 1-10

5. Mark and weigh each strip separately beforehand (Tare column). Use disposable gloves when handling and weighing the strips. Refer to Table 6–9.

6. Place the 96-well plate with the 8 x 12 well microstrips into the plate carrier of the Multidrop Combi.

7. Use high-purity water. Press the **PRIME** button until all eight channels are dispensing continuously into the priming vessel.

8. Press the **START** button to start the first dispensing. Wait until all 10 columns have been dispensed. Repeat this step until dispensing has taken place 5 times in all with the small tube cassette (final volume per well ~ 50 µl) or once with the standard tube cassette (final volume per well ~ 100 µl).

9. Weigh each dispensed strip (Gross column) immediately after dispensing to avoid evaporation. The water that you use in the gravimetric method may be subject to evaporation depending on the environmental conditions during accuracy verification. Refer to Table 6–7.

10. Calculate the net weights of the dispensed strips (Net column), the dispensed volume per well in mg (Dispensed weight per well (mg) column), the dispensed volume per well in µl (Measured volume (µl) column), and the inaccuracy percentage (Inaccuracy % column) as in the example table. Refer to Table 6–8. If desired, you can also calculate the average dispensed volume and inaccuracy percentage for the whole plate.

11. Depending on the results obtained, perform the calibration described below ("Precision verification (photometric)" on page 85). Refer to Chapter 7: "*Technical Specifications*".

Accuracy verification worksheet

Date:

Temperature:

Dispensing cassette sn:

Table 6–7. Volume conversion factor

Water volume conversion factor (Z) with pressure of 1013 mbar	
Water temperature °C	Conversion factor
16.0	1.0021
18.0	1.0025
20.0	1.0029
22.0	1.0033
24.0	1.0038
26.0	1.0043
28.0	1.0048

Table 6–8. Example of an accuracy verification measured with a small tube cassette at 22°C

Channel/ Strip	Strip weight (g)			Dispensed weight of one dispense per well (mg)	Measured volume (µl)	Inaccuracy %
	Tare	Gross	Net	Strip Net x 1000 / 10 x 5	Weight per well x conversion factor (Z)	(Measured volume – Set volume) x 100 / Set volume
A	3.8707	4.3876	0.5169	10.3383	10.37	3.72
B	3.8699	4.3832	0.5133	10.2667	10.30	3.01
C	3.8623	4.3752	0.5129	10.2583	10.29	2.92
D	3.8643	4.3925	0.5282	10.5633	10.60	5.98
E	3.8635	4.3848	0.5213	10.4250	10.46	4.59
F	3.8717	4.3911	0.5194	10.3883	10.42	4.23
G	3.8718	4.3861	0.5143	10.2850	10.32	3.19
H	3.8722	4.3972	0.5250	10.5000	10.53	5.35
Mean (whole plate)/Average of channels A – H					10.41	4.12

Table 6–9. Accuracy verification results

Channel/ Strip	Strip weight (g)			Dispensed weight of one dispense per well (mg)	Measured volume (µl)	Inaccuracy %
	Tare	Gross	Net	Strip Net x 1000 / 10 x 5 (small cassette)/10 x 1 (standard cassette)	Weight per well x conversion factor (Z)	(Measured volume – Set volume) x 100 / Set volume
A						
B						
C						
D						
E						
F						
G						
H						
Mean (whole plate)/Average of channels A – H						

Precision verification (photometric)

This section describes the materials and steps needed for precision verification.

Materials and equipment required for precision verification

The following materials and equipment are required for precision verification:

- Microplate photometer set to measure absorbance at 540 nm (measurement range 0 – 2 Abs, resolution 0.001 Abs)
- Two 96-well plates, for example, Thermo Scientific Microtiter Assembly Strip 1 x 8 (Cat. no. 95029350) or Thermo Scientific Microtiter Microplate (Cat. no. 9502227)
- Ponceau S reagent (BDH product # 341362T or equivalent); you will need 0.4% and 0.08% (small tube cassette)/0.004% and 0.008% (standard tube cassette) stock solutions (absorbance approximately 1 at 540 nm) (see Table 6–10). Use filtered and preferably fresh reagent.

Note With small tube cassettes, ensure that the dispensed liquid does not contain particles > 50 µm. ▲

- A 0.02% v/v solution of Tween (Fluka or equivalent) in deionized distilled water

Precision verification procedure

Perform the following procedure at two test volumes of 2 µl and 10 µl (small tube cassette)/20 µl and 100 µl (standard tube cassette) (Table 6–10).

Table 6–10. Precision verification procedure data

Cassette type	Ponceau S stock solution concentration (w/v)	Ponceau S stock solution Volume dispensed per well	Tween (0.02% v/v) Volume dispensed per well
Small tube cassette	0.4% 0.08%	2 µl 10 µl	200 µl 190 µl
Standard tube cassette	0.04% 0.008%	20 µl 100 µl	180 µl 100 µl

1. Install the dispensing cassette into the working position so that the lower and upper parts of the dispensing cassette are inserted into their slots.
2. Pull the rotor cover over the rotor.
3. Ensure that the priming vessel is installed.

4. Set the Multidrop Combi to deliver Ponceau S solution by inserting all eight channel tubes into the first Ponceau S stock solution vessel of the two.

5. Set the Multidrop Combi to dispense the first Ponceau S volume. Select the 96 standard (15mm) plate.

6. Press the **PRIME** button to predispense the tubes.

7. Insert the first empty, 96-well plate (Microplate A) into the plate carrier. Dispense the first volume into each well of the plate.

8. Empty the tubing of the first stock solution and insert all eight channel tubes into the second Ponceau S stock solution vessel.

9. Set the Multidrop Combi to dispense the second Ponceau S volume. Press the **PRIME** button to predispense the tubes. Insert the second empty, 96-well plate (Microplate B) into the plate carrier. Dispense the second volume into each well of the plate (Table 6–11).

10. Predispense the Multidrop Combi with Tween (0.02% v/v). Dispense the Tween solution into each well of both microplates. Use the *Low* dispensing speed in this step to reduce foaming. Dispense the appropriate volume according to Table 6–10. Note that the maximum volume with the small tube cassette is 50 µl. You must dispense appropriate aliquots several times. If you use the standard tube cassette, you can dispense the whole volume in one go.

11. Shake the plate 15 seconds before measurement in the microplate reader or Multidrop Combi. Measure Abs_{test}, the absorbance of each well at 540 nm, in both microplates using a microplate photometer with a measurement range of 0 to 2 Abs and a resolution of 0.001 Abs. Attach a table of the Abs_{test} values to Table 6–11.

12. Calculate the average absorbance for each of the two microplates:

    Abs_{mean} = mean absorbance of each well = $\sum Abs_{test} \div 96$

13. Record the value of Abs_{mean} for each of the two microplates in Table 6–11.

14. Calculate the standard deviation results obtained for each microplate by using the following equation, or the STDEVP function in MS Excel or the σ function in a scientific calculator, and record the results in Table 6–11.

    Standard Deviation= $\sqrt{((\sum (Abs_{test} - Abs_{mean})^2 / 96)}$

15. Calculate the coefficient of variation, CV%, for the Standard Deviation obtained for each microplate, and record the results in Table 6–11. Compare the CV% values to the criteria in Table 6–10.

    CV% = (Standard Deviation Abs_{test} / Abs_{mean}) x 100

Table 6–11. Photometric test data

	Microplate A: Volume 1	Microplate B: Volume 2
Set dispense volume:	µl	µl
Mean absorbance / well (Abs_{mean}):		
Standard Deviation (SD) of Abs_{test} values:		
CV% = (SD Abs_{test} / Abs_{mean}) x 100:		

Calibration (gravimetric)

If necessary, calibration is carried out after performing the accuracy verification described above.

Note It is recommended to let the dispensing cassette rest for a minimum of 10 hours before recalibration depending on the reagent used. ▲

Material and equipment required for calibration

The following materials and equipment are required for calibration:

- Multidrop Combi with the dispensing cassette to be verified inserted
- Analytical balance (resolution at least 0.1 mg, preferably 0.01 mg)
- Calibrated thermometer (readable to 0.5°C)
- 96-well plate with 8 x 12 well microstrips (for example, Microtiter 1 x 12 Strip Assembled, Universal Binding Flat, Cat. no. 95029370) or another similar 8 x 12 strip plate
- Disposable gloves
- High-purity water (deionized distilled water)

Calibration procedure

1. Install the dispensing cassette into the working position so that the lower and upper parts of the dispensing cassette are inserted into their slots (Figure 4–14).

2. Pull the rotor cover over the rotor. If the instrument is equipped with the SMART option and a SMART cassette is being used, the calibration data window appears and the calibration data can be viewed.

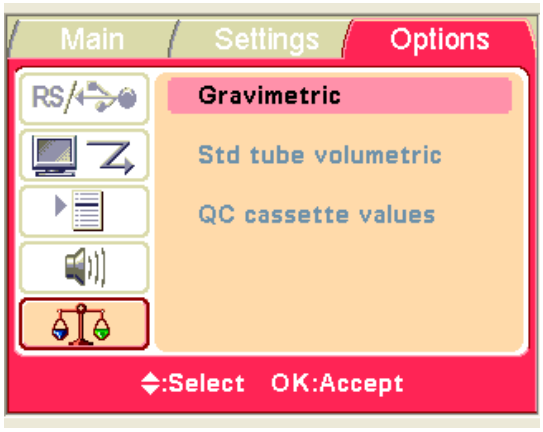
Press the **OK** or **STOP** button to deactivate the calibration data window.

3. Ensure that the priming vessel is installed.

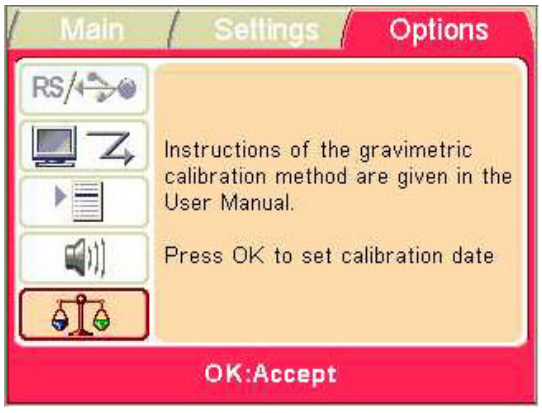
4. Set the Multidrop Combi parameters as follows (see "Dispensing parameters" on page 38):

   Plate type: 96 standard (15mm)
   Dispensing volume and cassette:
   10 µl (small tube cassette)/100 µl (standard tube cassette)
   Selected columns: 1-10

5. Select Options > Calibration > **Gravimetric**.



Press **OK**.



Press **STOP**.

6. Open the calibration screw cover (Figure 6–49) on the upper part of the cassette.

7. Use high-purity water. Place the tube of channel A (Figure 11–54 on page 114) into the reservoir with water at room temperature (working temperature).

8. Press the **PRIME** button until the channel is dispensing continuously into the priming vessel.

9. Tare an analytical balance to 0 with one empty, dry 1 x 12 well microstrip. Use disposable gloves when handling and weighing the strips.

10. Place the microstrip into the microplate frame on the row corresponding to the channel to be recalibrated (from A to H).

11. Press the **START** button to start dispensing.

12. Weigh the filled microstrip (Figure 6–49). The balance should now read 100 mg ± 5 mg (small tube cassette)/1000 mg ± 20 mg (standard tube cassette).

Figure 6–49. Removing the filled microstrip to be weighed

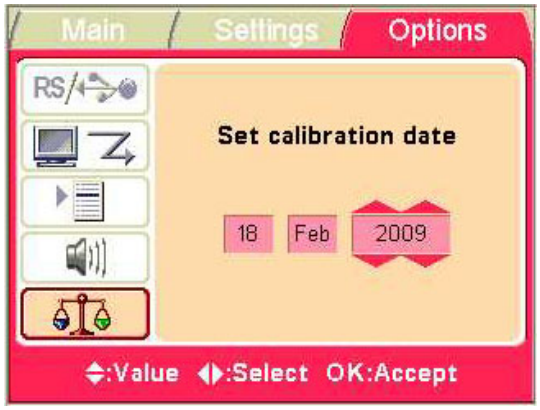
13. If the balance reads < 100 mg (small tube cassette)/< 1000 mg (standard tube cassette), turn the calibration screw counterclockwise, one turn corresponding to approximately 0.1 µl (small tube cassette)/1 µl (standard tube cassette). If the balance reads > 100 mg, turn in the opposite direction (Figure 6–50). Recheck the delivery after each adjustment using steps 8 to 10. Three acceptable calibrations must be obtained.

Figure 6–50. Screwing a calibration screw according to the calibration results

14. Continue in the same way with each channel until all eight channels have been recalibrated and close the calibration screw cover.

15. Continue to set the calibration date.

OK Select Calibration > Gravimetric > **OK**.



Use the **Left** and **Right** arrow keys to select the day, month or year.

Use the **Up** and **Down** arrow keys to enter the real-time calibration date.

OK Press **OK**.

Now the cassette contains the new calibration date, the **Since last calibration** shows 0%, but the **Total usage** remains unchanged and is always summed up.

Calibration (standard tube volumetric)

For volumetric calibration, use the following steps:

1. Insert the dispensing cassette into the working position so that the lower and upper parts of the dispensing cassette are inserted into their slots (Figure 4–14).

2. Install the tube of the calibration device into the tip of the channel to be recalibrated (Figure 6–51), for example, A.

Figure 6–51. Placing the tube onto the tip of channel A

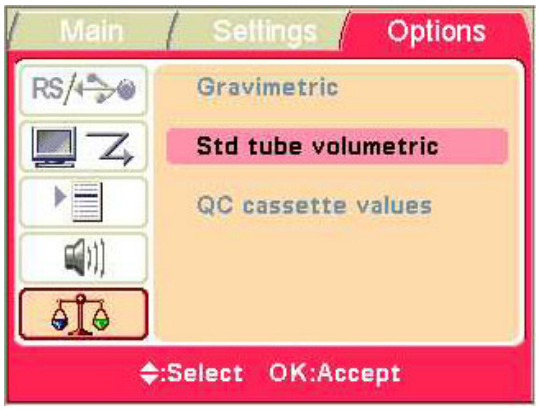
3. Pull the rotor cover over the rotor.

Press the **OK** or **STOP** button to deactivate the calibration data window.

4. Place the tube of channel A into the reservoir with water at room temperature (working temperature).

5. Open the calibration screw cover on the upper part of the cassette (Figure 6–53).

6. Select Options > Calibration > **Std tube volumetric**.



OK Press **OK**.

PRIME 7. Press the **PRIME** button until the water enters the calibration pipette.

8. Adjust the water level in the pipette to the lower mark (0.9) by pulling or pushing the syringe piston (Figure 6–52).

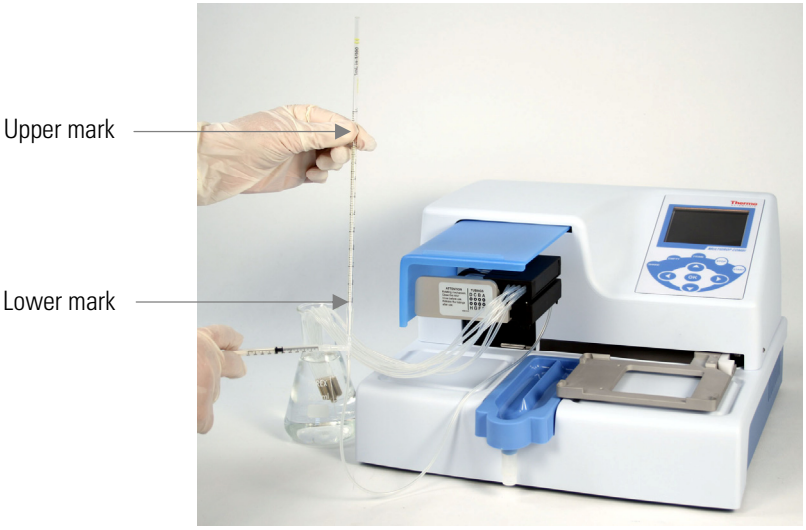


Figure 6–52. Adjusting the liquid level first to the lower mark and then to the upper mark

START 9. Press the **START** button and wait until the water level stops. It should be at the upper mark (-0.1), 1000 µl (± 1.5%) (Figure 6–52).

10. If the volume is higher than 1000 µl, turn the calibration screw (Figure 6–53) clockwise with a screwdriver; one turn for each 1 µl (1% from the volume dispensed); if the volume is lower than 1000 µl, turn in the opposite direction.

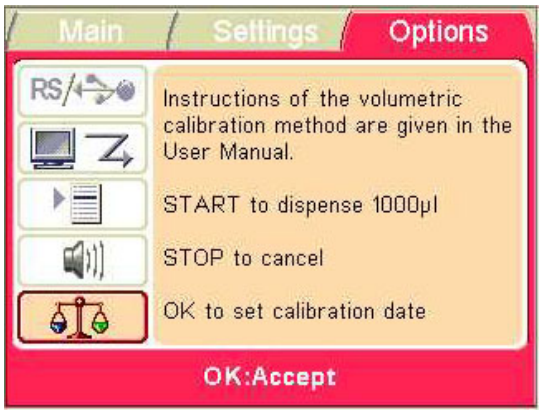
Figure 6–53. Screwing the calibration screws according to the calibration results

11. Press the **EMPTY** and **PRIME** keys and the syringe to adjust the water level in the pipette to the lower mark and repeat steps 7 to 10 until the result is 1 ml. Three accurate calibrations must be obtained.

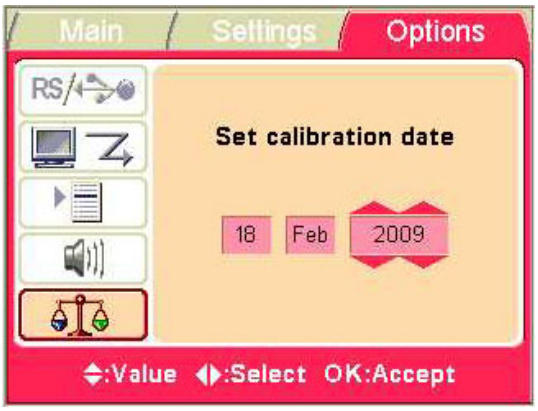
Note The **PRIME** button must be pressed before **START**. ▲

12. Change the tube to the next channel and repeat steps 7 to 11.

13. Continue to set the calibration date.



Press **OK** to set the calibration date for a SMART cassette or to continue.



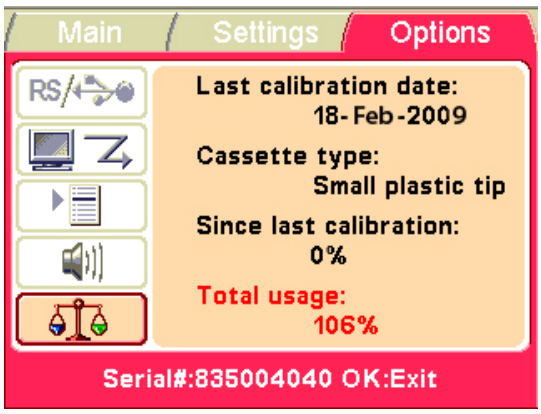
Use the **Left** and **Right** arrow keys to select the day, month or year.

Use the **Up** and **Down** arrow keys to enter the real-time calibration date.

Press **OK**.

14. Close the calibration screw cover.

Now the cassette contains the new calibration date, the **Since last calibration** shows 0%, but the **Total usage** remains unchanged and is always summed up.



Chapter 7
Technical Specifications

General specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program.

Table 7–12. General specifications

General specifications		
Overall dimensions	355 mm (14 in.) (W) x 330 mm (12.9 in.) (D) x 220 mm (8.6 in.) (H)	
Weight (total)	**Instrument** 9.1 kg (15.7 lbs.)	**Dispensing cassette** 128 g (0.3 lb.)
Mains power supply	100 – 240 Vac, 50/60 Hz, nominal (operating range 90 – 256 Vac)	
Power consumption	100 VA max.	
Heat dissipation	341 BTU max.	
Fuses	none	
Operating conditions (indoor use)	+10°C to +40°C	
Transportation conditions	-40°C to +70°C, packed in transport packaging	
Storage conditions	-25°C to +50°C, packed in transport packaging	
Autoclaving conditions of the dispensing cassette and priming vessel	pressure: 1 bar temperature: 121°C time: 20 min autoclavings: 10 times (small tube cassettes)/ 50 times (standard tube cassette)	
Control panel	Keys: arrow keys, **OK**, **START**, **STOP**, **PRIME**, **EMPTY**, **SHAKE**	
Interface	Serial RS-232C, USB 1.1 (2.0 compatible)	
	Small tube dispensing cassette	
Dispensing volume	0.5 – 50 µl, in 0.5 µl increments	
Dispensing speed	5 s/1 µl into 384 wells 8 s/5 µl into 384 wells 12 s/10 µl into 384 wells 20 s/20 µl into 384 wells 44 s/150 µl into 384 wells 14 s/1 µl into 1536 wells 26 s/5 µl into 1536 wells	
Dispensing accuracy *	2 µl: ± 10% (typical)	

Continued

Cont.

General specifications		
	10 µl: ± 5% (typical) > 10 µl: ± 5% (typical)	
Dispensing precision *	0.5 µl: CV ≤ 10% 2 µl: CV ≤ 5% 10 µl: CV ≤ 3% > 10 µl: CV ≤ 3%	
	Standard tube dispensing cassette	
Dispensing volume	5 – 2500 µl, in 5 µl increments	
Dispensing speed	3 s/10 µl into 96 wells 4 s/20 µl into 96 wells 10 s/100 µl into 96 wells 20 s/300 µl into 96 wells	5 s/5 µl into 384 wells 6 s/10 µl into 384 wells 9 s/20 µl into 384 wells
Dispensing accuracy *	5 µl: ± 3% (typical) 20 µl: ± 2% (typical) 100 µl: ± 1% (typical) > 100 µl: ± 1% (typical)	
Dispensing precision *	5 µl: CV ≤ 10% 20 µl: CV ≤ 1.5% 100 µl: CV ≤ 1% > 100 µl: CV ≤ 1%	

* Dispensing accuracy and precision are valid at 22°C ± 2°C with deionized distilled water.

Safety specifications

This section describes the safety specifications for the Multidrop Combi instrument.

Live parts

The instrument is safe to operate with the covers fitted and these must not be removed during operation. The covers protect the user from live parts and they should only be removed after switching the instrument off and disconnecting the mains supply cable, and only by suitably qualified maintenance and repair personnel.

Warning The instrument uses voltages dangerous for human beings. Before removing any covers, disconnect the instrument from the power supply. ▲

In conformity with the requirements

Multidrop Combi bears the following markings:
Type 836
100 – 240 Vac, 50/60 Hz, 100 VA
CE mark
CSA monogram

Multidrop Combi conforms to the following requirements:
2006/95/EC (Low Voltage Directive)
2004/108/EC (Electromagnetic Compatibility Directive EMC)
FCC Part 15, Subpart B/Class B (July 2004)
2002/96/EC (Waste of Electrical and Electronic Equipment)

Safety performance:
EN 61010-1:2001 (Ed. 2) taking into account US and CA National differences

The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:	
Altitude	Up to 2000 m
Temperature	+5°C to +40°C
Humidity	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
Mains supply fluctuations	± 10% from nominal

EMC performance:	
EN 61000-6-3:2001	Generic standards – Emission standard for residential, commercial and light-industrial environments
EN 61000-6-1:2001	Generic standards – Immunity standard for residential, commercial and light-industrial environments
EN 61326-1:1997 + A1:1998 + A2:2001 + A3:2003	Product family standard

Test standards	Performance limits
EN 55022:1998 + A1:2000 + A2:2003	Class B, 150 kHz – 1 GHz
EN 61000-3-2:2000	Class A
EN 61000-3-3:1995 + A1:2001	
ANSI C63.4:2003	Class B, 150 kHz – 30 MHz; 30 MHz – 1 GHz
EN 61000-4-2:1995 + A1:1998 + A2:2001	4 kV CD, 8 kV AD, Criteria B
EN 61000-4-3:2002 + A1:2002	3 V/m, 80 MHz – 2 GHz, Criteria A
EN 61000-4-4:2004	1 kV, Criteria B
EN 61000-4-5:1995 + A1:2001	2 kV line to ground, 1 kV line to line, Criteria B
EN 61000-4-6:1996 + A1:2001	3 V_{rms}, 150 kHz – 80 MHz, Criteria A
EN 61000-4-8:1993 + A1:2001	30 A/m, Criteria A
EN 61000-4-11:1994 + A1:2001	30%/10 ms, Criteria B 60%/100 ms, Criteria B 100%/10 ms, Criteria B 100%/5 s, Criteria C

Remote control to Multidrop Combi

The Multidrop Combi can be used as part of a robot system.

When the Multidrop Combi is in remote mode, the main view is as shown below. For more details, refer to the *Thermo Scientific Multidrop Combi Remote Control Command Sets* document (Cat. no. D04640). Contact your distributor or local Thermo Fisher Scientific representative to obtain the said document.

The instrument has two alternative computer interfaces: RS232 and USB.

Note It is recommended to use USB to improve the reliability of traffic in robot applications. ▲

The interface to use is selected from the Multidrop Combi user interface.

Chapter 8
Frequently Asked Questions

Q&As

Q1: Can the dispensing cassettes of the Multidrop Combi be used in the Multidrop 384 and Thermo Scientific Multidrop DW?

A1: Yes, the dispensing cassettes are interchangeable. The standard tube cassette (Cat. no. 24072670) can be used in the Multidrop 384 and Multidrop DW. The small tube cassettes (Cat. no. 2407390 and 2407395) can be used in the Multidrop Micro.

Q2: Can the Dispensing cassette, machined covers (Cat. no. 24070300) be used in the Multidrop Combi?

A2: No, it cannot be used.

Q3: How many times can the Multidrop Combi dispensing cassettes be autoclaved?

A3: Either 10 times (small tube cassettes, Cat. no. 2407390 and 2407395) or 50 times (standard tube cassette, Cat. no. 24072670).

Q4: Can the dispensing cassettes with the SMART option be autoclaved?

A4: Yes, as many times as the cassettes without the RFID tag.

Q5: What are the autoclaving conditions for the dispensing cassettes?

A5: The autoclaving conditions are as follows: 1 bar pressure at 121°C for 20 minutes.

Q6: What is the dead volume of the dispensing cassettes of the Multidrop Combi with 40 cm tubing?

A6: The dead volume is about 1.0 ml with the small tube cassettes. However, the dead volume is < 7 ml for the standard tube cassette.

Q7: Does the dispensing cassette of the Multidrop Combi include a calibration certificate?

A7: Yes, all dispensing cassettes include a factory calibration report.

Q8: What liquid is recommended to be used for washing the Multidrop Combi tubes?

A8: It is recommended that you use deionized distilled water and/or detergent solutions, for example, 0.2 – 1% Tween followed by deionized distilled water.

Q9: When do you have to calibrate the dispensing cassettes of the Multidrop Combi?

A9: It is recommended that you recalibrate at least monthly, depending on the frequency of use and the liquids used.

Q10: Can the dispensing cassettes of the Multidrop Combi be recalibrated?

A10: Yes, they can.

Q11: What is the tip inner diameter of the dispensing cassettes of the Multidrop Combi?

A11: The tip inner diameter is either 0.22 mm (Small tube plastic tip dispensing cassette, Cat. no. 24073290, and Small tube metal tip dispensing cassette, Cat. no. 24073295), or 0.5 mm (Standard tube dispensing cassette, Cat. no. 24072670).

Q12: Do particles in the reagent affect dispensing?

A12: Possibly. It is recommended that you ensure that there are no particles > 50 µm in the reagent to avoid blockage of the tips, especially when working with small tube cassettes.

Q13: What materials come into contact with liquids to be dispensed?

A13: The Small tube plastic tip dispensing cassette, Cat. no. 24073290, and the Standard tube dispensing cassette, Cat. no. 24072670, are made of: PEEK, silicone, and PP (polypropylene).

The Small tube metal tip dispensing cassette, Cat. no. 24073295, is made of: PEEK, silicone, ruby, and stainless steel.

Q14: What should you do if the liquid foams during dispensing?

A14: Some liquids foam more easily than others. One option is to reduce the pump rotor speed. There are three dispensing speeds available: *High*, *Med* (medium), and *Low*.

Q15: Do you need specific plate adapters for the Multidrop Combi?

A15: No, the Multidrop Combi has a fixed plate adapter and does not use any external plate adapters.

Q16: What is the material of the Multidrop Combi priming vessel?

A16: The Multidrop Combi priming vessel (Cat. no. N05640) is made of blue polypropylene (PP).

Q17: Can the Multidrop Combi priming vessel be autoclaved?

A17: Yes, it can be autoclaved.

Q18: Where can you see the Multidrop Combi internal software version number?

A18: When the instrument is powered on, the version number only appears on the bottom of the screen during the startup animation.

Q19: Can the SMART cassettes with RFID tags be used with the standard Multidrop Combi without SMART option or vice versa?

A19: Yes, but then the calibration data cannot be viewed and the information about the cassette is not updated. Also standard cassettes can be used with the Multidrop Combi with SMART option.

Chapter 9
Troubleshooting Guide

Note Do not use the instrument if it appears that it does not function properly. ▲

Error and warning codes

When an error is detected, the current operation is terminated. After an error, it is best to abort the current run and restart from the beginning after the problem is fixed. The Multidrop Combi internal software has the following error messages (Table 9–13).

Table 9–13. Error messages reported

Code	Error	Cause	Action
4	Pump position error.	Peristaltic pump cannot rotate	Power off/on (or contact service).
5	Plate X position error.	Plate carrier cannot move	Power off/on (or contact service).
6	Plate Y position error.	Plate carrier cannot move	Power off/on (or contact service).
7	Z position error.	Pump lifting mechanism cannot move	Power off/on (or contact service).
11	No more memory for storing user data.	Too many protocols saved	Delete protocols that are not used.
14	Cannot dispense when pump not primed.	Predispensing undone	Press the **PRIME** button.
15	Missing prime vessel.	Priming vessel missing	Insert the priming vessel.
16	Rotor shield not in place.	Rotor cover not in place	Pull the rotor cover over the pump.

Examples of a few *error messages* that appear in the Multidrop Combi internal software are shown below.

OK PRIME

Press **OK** to acknowledge the error and then press **PRIME**.

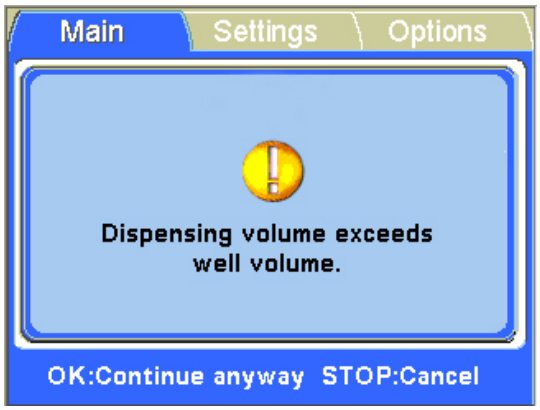
OK

Press **OK** to acknowledge the error and then insert the priming vessel.

OK

Press **OK** to acknowledge the error and then pull the rotor cover over the rotor.

An example of a *warning message* that appears in the main view of the Multidrop Combi internal software is shown below.



Press **OK** to acknowledge the warning and continue dispensing or press **STOP** to cancel and then reselect the dispensing volume.

Hazards

This instrument is designed to provide full user protection. When correctly installed, operated and maintained, the instrument will present no hazards to the user.

The following recommendations are given to ascertain added user safety.

Electrical

Ensure that the mains supply cable supplied with the unit is always used.

The mains plug should only be inserted into a socket outlet provided with a protective ground contact.

Warning There are no user-replaceable parts inside the instrument. The user should not remove the cover from the Multidrop Combi. ▲

The same precautions applicable when using any electrical equipment should be observed with this instrument. Do not touch switches or electrical outlets with wet hands. Switch the instrument off before disconnecting it from the mains supply.

Mechanical

The dispensing cassette is a free-moving mechanical device controlled by the instrument and not directly by the operator. It is designed for "hands-off" operation and should be used as such. Never reach into the work space, while the instrument is performing a dispensing cycle.

If it is necessary to stop the operation of the equipment, press the **STOP** button on the control panel.

Environmental

Infectious samples and corrosive fluids are commonly used with this equipment. The “hands-off” nature of the system allows the user to dispense into the reaction wells without getting into direct contact with these fluids. However, the wells that have been in contact with potentially hazardous fluids must be handled with utmost care. Always wear hand and eye protections as well as corrosive resistant laboratory coats.

Warning Observe normal laboratory procedures for handling potentially hazardous samples. ▲

Defects and abnormal stresses

Whenever it is likely that the protection against safety hazards has been impaired, make the instrument inoperative and secure against any unintended operation.

The protection is likely to be impaired if, for example, the instrument:

- Shows visible damage.
- Fails to perform the intended functions.
- Has been subjected to prolonged storage under unfavorable conditions.
- Has been subjected to severe transport stresses.

Service request protocol

If the Multidrop Combi requires service, contact your local Thermo Fisher Scientific representative or the Thermo Fisher Scientific technical service department. Do not under any circumstances send the instrument for service without any prior contact. It is imperative to indicate the fault and nature of the required service. This will ensure a faster return of the instrument to the customer.

Your local Thermo Fisher Scientific representative or distributor will take care of sending a complaint form (that is, the Warranty Claim Technical Sheet) to the Thermo Fisher Scientific technical service department. The Warranty Claim Technical Sheet contains a more detailed description of the fault, symptom or condition. Give all the necessary information to the distributor, who will fill out and forward the Warranty Claim Technical Sheet to the Thermo Fisher Scientific technical service department.

Check “Packing for service” on page 68. You will find instructions on how to proceed before shipping the instrument for service to Thermo Fisher Scientific Oy.

Check that any necessary decontamination procedure has been carried out before packing. Refer to "Decontamination procedure" on page 66 and "Certificate of Decontamination" on page 107. Ensure that the Certificate of Decontamination (see Appendix B: "*Certificate of Decontamination*") as well as the return authorization number (RGA) are sent with the instrument.

The Thermo Fisher Scientific technical service department will keep you up to date with the progress of service and provide you with any further details you might need, for example, on maintenance, serviceability, troubleshooting and replacement.

Certificate of Decontamination

The decontamination procedure is required before shipping the instrument to Thermo Fisher Scientific Oy, for example, for repair. If, for any reason, the instrument is shipped back to Thermo Fisher Scientific Oy, it must be accompanied by a dated and signed Certificate of Decontamination, which must be attached to the outside of the package containing the instrument. Refer to Appendix B: "*Certificate of Decontamination*" and "Decontamination procedure" on page 66.

Failure to confirm decontamination will incur additional labor charges or at worst the items will be returned for proper cleaning. Before returning any instrument(s) or item(s), ensure that they are fully decontaminated. Confirm A or B status. Refer to Appendix B: "*Certificate of Decontamination*".

Chapter 10
Ordering Information

Multidrop Combi

Contact your local Thermo Fisher Scientific representative for ordering and service information.

Table 10–14. Instrument catalog number

Code	Instrument / System
5840300	Multidrop Combi, 100 – 240 V, 50/60 Hz
5840310	Multidrop Combi with SMART option, 100 – 240 V, 50/60 Hz

Dispensing cassettes

Table 10–15. Codes for dispensing cassettes

Code	Item
24073290	Small tube plastic tip dispensing cassette
24073291	Small tube plastic tips dispensing cassette (pack of 5)
24073292	SMART small tube plastic tip dispensing cassette
24073295	Small tube metal tip dispensing cassette
24073296	Small tube metal tip dispensing cassette (pack of 5)
24073297	SMART small tube metal tip dispensing cassette
24073001	SMART small tube plastic tip dispensing cassette 5-pack
24073002	SMART Small tube metal tip dispensing cassette 5-pack
24072670	Standard tube dispensing cassette
24072671	Standard tube dispensing cassette 5-pack
24072672	Standard tube dispensing cassette 10-pack
24072675	SMART standard tube dispensing cassette (with 40 cm tubing set)
24072676	SMART Standard tube dispensing cassette 5-pack
24072677	Long standard tube dispensing cassette (length of tubing 50-200 cm in 10 cm increments)
24072678	SMART long standard tube dispensing cassette
24073293	Long small tube plastic tip dispensing cassette
24073298	Long small tube metal dispensing cassette

List of accessories

Table 10–16. Codes for accessories

Code	Item
N05616	*Multidrop Combi User Manual*
N05640	Priming vessel, Multidrop Combi
N05843	Priming vessel tube assembly and cap
1210550	Cord mains EURO
1210520	Cord mains UL/CSA
2305290	Serial cable F9/F25
N04001	USB A-B device cable *
030003	Tool 3mm DIN911 Allen key handled
95029370	Microtiter 1x12 strip assembled, UB, flat bottom (min. order size 5000 pcs) **
95040000	Microtiter 384 plate, round well (5 pcs)

* not included

** alternative plate option Nunc Cat. no. 473709 (see Table 10–17)

List of plates

Table 10–17. Codes for plates

Code	Item	Quantity
	96-well microplates	
3355	Immulon 1B plate, flat bottom	50 pcs/box
9502227	96 well plate UB, flat bottom	50 pcs/box
7571	Microlite 1 + plate, flat bottom	50 pcs/box
9502887	White 96 well plate UB, flat bottom	50 pcs/box
7605	Microfluor 1 black plate, flat bottom	50 pcs/box
9502867	Black 96 well plate UB, flat bottom	50 pcs/box
473709	C12 Maxisorp Nunc-Immuno Module	60 pcs/box
95040450	Microtiter 96 deep well plate	50 pcs/box
	384-well microplates	
95040000	384 round well plate	50 pcs/box
95040020	White 384 round well plate	50 pcs/box

Chapter 11
References

Literature

Editorial (2004): Multidrop bulk reagent dispenser family from Thermo Electron; precise dispensing in the microliter area allowing assay miniaturization. *Innovations in Pharmaceutical Technology* **4** (14), 36.

Falconer M. et al. (2002): High-Throughput Screening for Ion Channel Modulators. *Journal of Biomolecular Screening* **7** (5), 460 – 465.

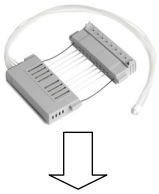
Kiger A. A. et al. (2003): A functional genomic analysis of cell morphology using RNA interference. *Journal of Biology* **2**, 27.

Tanaka M. et al. (2005): An unbiased cell morphology-based screen for new, biologically active small molecules. *PLoS Biology* **3** (5), e128.

Yarrow J. C. et al. (2004): A high-throughput cell migration assay using scratch wound healing, a comparison of image-based readout methods. *BMC Biotechnology* **4**, 21.

Appendix A
6 – 48-Well Plate Dispensing Instructions

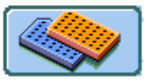
To dispense into a 6, 12, 24, or 48-well plate, leave some of the channels empty of liquid and select only some of the columns.

1. 

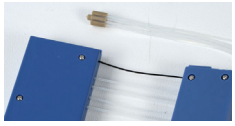
   Insert the correct dispensing cassette and the priming vessel. Close the rotor cover.

2.

   Make sure you are in the **Main** menu.

3. 

   Select **96** as the plate type and insert the 6, 12, 24, or 48-well plate.

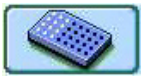
4. 

   Remove the tubes for the channels you leave empty from the tubing weight manually. Keep the removed tubes outside the reagent bottle while dispensing.

   For information about the channel settings (Figure 11–54), see the following sections below.

5.

   First select the cassette type and then the dispensing volume.

6. 

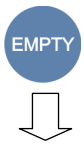
   Select the columns. For information about the column settings, see the following sections below.

7.

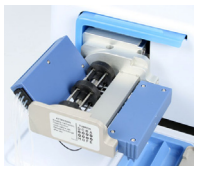
   Keep the **PRIME** button down until the tubings are completely filled.

8.

Press the **START** button to start the protocol. The instrument dispenses the plate.

9. 

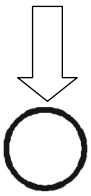
Press the **EMPTY** button to empty the dispensing tubing.

10. 

During prolonged standby, keep the cassette in its rest position.

Remove the cassette when the maximum amount of plates are dispensed or you want to change the cassette type in use.

Make sure you wash the cassette properly.

11. 

Power OFF the instrument.

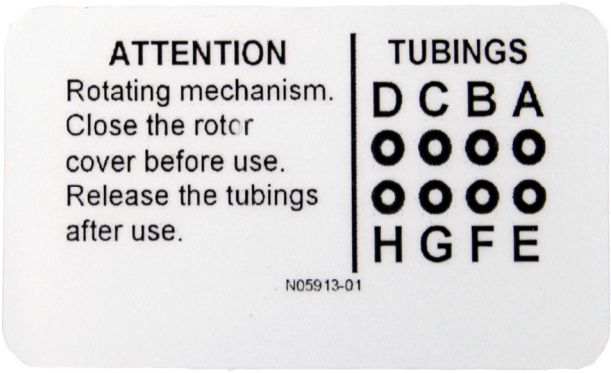


Figure 11–54. Tube order in the dispensing cassette

6-well plate settings

First select a 96-well plate with an appropriate height.

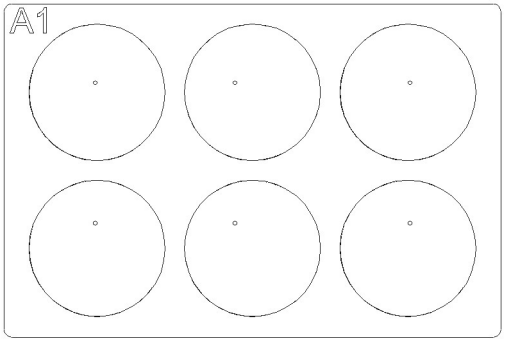


Figure A–55. Columns and channels for a 6-well plate setup

Table A–18. Channel and column settings for a 6-well plate

Dispensing cassette: Channel settings		Multidrop Combi: Column settings	
Channel	**Tube in tubing weight**	**Column**	**Selection**
A	**removed**	1	unselected
B	in place	2	**selected**
C	**removed**	3	unselected
D	**removed**	4	unselected
E	**removed**	5	unselected
F	in place	6	**selected**
G	**removed**	7	unselected
H	**removed**	8	unselected
		9	unselected
		10	unselected
		11	**selected**
		12	unselected

12-well plate settings

First select a 96-well plate with an appropriate height.

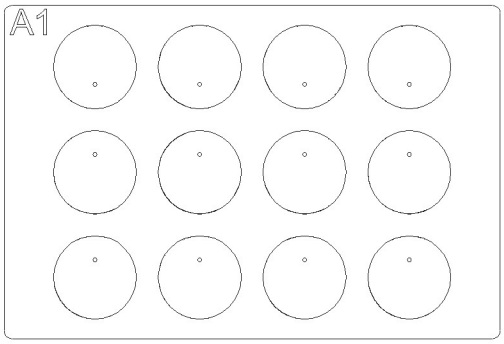


Figure A–56. Columns and channels for a 12-well plate setup

Table A–19. Channel and column settings for a 12-well plate

Dispensing cassette: Channel settings		Multidrop Combi: Column settings	
Channel	**Tube in tubing weight**	**Column**	**Selection**
A	**removed**	1	unselected
B	in place	2	**selected**
C	**removed**	3	unselected
D	in place	4	unselected
E	**removed**	5	**selected**
F	**removed**	6	unselected
G	in place	7	unselected
H	**removed**	8	**selected**
		9	unselected
		10	unselected
		11	**selected**
		12	unselected

24-well plate settings

First select a 96-well plate with an appropriate height.

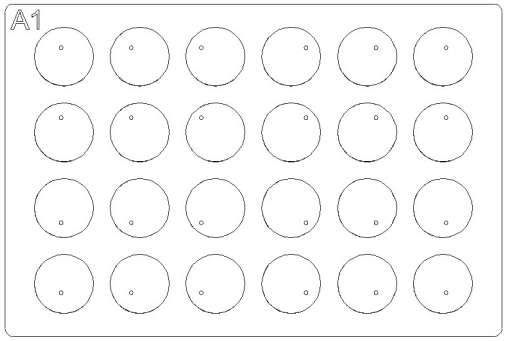


Figure A–57. Columns and channels for a 24-well plate setup

Table A–20. Channel and column settings for a 24-well plate

Dispensing cassette: Channel settings		Multidrop Combi: Column settings	
Channel	**Tube in tubing weight**	**Column**	**Selection**
A	in place	1	**selected**
B	**removed**	2	unselected
C	in place	3	**selected**
D	**removed**	4	unselected
E	**removed**	5	**selected**
F	in place	6	unselected
G	**removed**	7	unselected
H	in place	8	**selected**
		9	unselected
		10	**selected**
		11	unselected
		12	**selected**

48-well plate settings

First select a 96-well plate with an appropriate height.

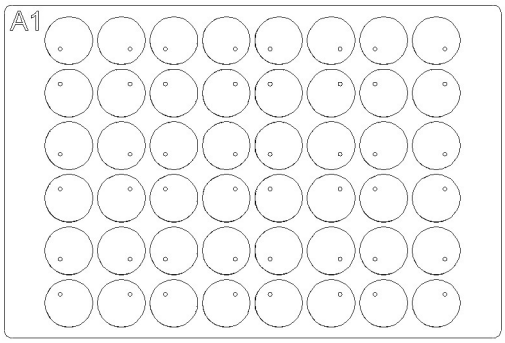


Figure A–58. Columns and channels for a 48-well plate setup

Table A–21. Channel and column settings for a 48-well plate

Dispensing cassette: Channel settings		Multidrop Combi: Column settings	
Channel	**Tube in tubing weight**	**Column**	**Selection**
A	in place	1	**selected**
B	in place	2	unselected
C	**removed**	3	**selected**
D	in place	4	**selected**
E	in place	5	unselected
F	**removed**	6	**selected**
G	in place	7	**selected**
H	in place	8	unselected
		9	**selected**
		10	**selected**
		11	unselected
		12	**selected**

Appendix B
Certificate of Decontamination

Name: _____

Address: _____

Tel./Fax: _____

Name: _____ Serial no.: _____

A) I confirm that the returned items have not been contaminated by body fluids, toxic, carcinogenic or radioactive materials or any other hazardous materials.

B) I confirm that the returned items have been decontaminated and can be handled without exposing the personnel to health hazards.

Materials used in the unit: Chemicals + Biological • Radioactive *)

Specific information about contaminants:

_____

_____

Decontamination procedure[1]:

_____

_____

Date and place: _____

Signature: _____

Name (block capitals): _____

*) The signature of a Radiation Safety Officer is also required when the unit has been used with radioactive materials.

This unit is certified by the undersigned to be free of radioactive contamination.

Date and place: _____

Signature: _____

Name (block capitals): _____

PHOTOCOPIABLE

[1] Please include decontaminating solution used.

Appendix C
Thermo Scientific Multidrop Combi Feedback Form

Instrument: Thermo Scientific Multidrop Combi ☐ Instrument serial no.:

PURCHASED BY	**PURCHASED FROM**
Company/Institute	Distributor
Department	Address
Address	
Tel.	Tel.
Fax	Date of delivery
Internet home page	
Date of purchase	
Your application area	
Dr. ☐ Mr. ☐ Mrs. ☐ Ms. ☐	Job title/Position
Surname (block capitals)	First name (block capitals)
Internet e-mail address	

	Excellent	Above expectations	As expected	Below expectations	Comments
Instrument installation	☐	☐	☐	☐	
Ease of use	☐	☐	☐	☐	
Flexibility	☐	☐	☐	☐	
User manual	☐	☐	☐	☐	
Software	☐	☐	☐	☐	
Customer support	☐	☐	☐	☐	
Overall	☐	☐	☐	☐	

Additional instrument and/or software features desired:

Did you encounter any problems?

Where did you first learn about the product?

Would you like to receive information about other Thermo Scientific products?

Glossary

antenna The tag antenna is the conductive element that enables the tag to send and receive data. The RF energy from the reader antenna is “harvested” by the antenna and used to power up the microchip, which then changes the electrical load on the antenna to reflect back its own signals. See RFID and RFID tag.

backflush (empty) The operation of discharging the contents of the tubing of fluid.

calibration screw The eight screws under the calibration screw cover that will adjust the length of the tube during calibration of the dispensing cassette (Figure 6–50).

CE marking "Conformité Européene" = European Conformity. CE Marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislations, the product may be legally placed on the market and thus the CE Marking ensures the free movement of the product within EU.

decontamination Removal or neutralization of radiologic, bacteriological, chemical or other contamination.

dispense To distribute (pipette) liquid into the wells of the preselected strips or microplate.

dispensing cassette The dispensing cassette contains eight individual tubes. The dispensing cassette is detachable and disposable.

dispensing height The tip position on top of the microplate. The distance between the bottom surface of the plate carrier to the tip of the dispensing tip (Table 4–3).

EIA Enzyme immunoassay.

emulation mode Running mode imitating the function of Multidrop 384 or Multidrop Micro.

EN European Norm.

EU European Union.

home position The plate carrier is positioned to the furthest right of the transfer rails.

IEC International Electrotechnical Commission.

PEEK Abbreviation for polyetheretherketone. It is a plastic material.

predispense The operation of filling a pump intake with fluid to expel the air.

predispensing (priming) Completely filling the dispenser tubing with bubble-free fluid to allow sustained, reproducible dispensing action. The air in an unpredispensed line acts as a spring, adversely affecting accuracy and precision.

remote control Running mode allowing a remote computer to operate the dispenser.

RFID Radio frequency identification, or RFID, is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is a small object that can be attached to or incorporated into a product. RFID tags contain silicon chips and antennas to enable them to receive and respond to radiofrequency queries from an RFID transceiver. See antenna and RFID tag.

RFID tag A microchip attached to an antenna that is packaged in a way that it can be applied to an object. The tag picks up and sends signals to a reader. The tag contains information, such as a serial number and parameters related to the product where the tag is attached. Tags come in many forms, such smart labels that can have a barcode printed on it, or the tag can simply be mounted inside a carton or embedded in plastic. See antenna and RFID.

tension limiting wires The tension limiting wires (Figure 4–10 and Figure 5–32) are designed to prevent the user from pulling the tubes too much as excessive tension may damage the tubes or change the calibration of the dispensing cassette.

USB Universal serial bus.

Glossary:

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